Accuracy of Self-Perceptions in Children and Adults with ADHD

Thesis

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Abstract

ADHD is associated with a wide range of social, emotional and cognitive sequelae. This accumulation of negative experiences has an impact on various factors, such as the individual's self-perceptions of competence and self-esteem, which in turn may advocate maladaptive coping strategies and interfere with treatment. Therefore, early assessment and intervention promoting accurate self-perception and meta-cognitive skills are crucial. Since ADHD is a disorder that persists in up to two thirds of the children into adulthood, it remains unclear whether eventual inaccurate self-perceptions are something that children with ADHD eventually outgrow, or whether they persist into adolescence and adulthood. Existing studies of self-perceptions and self-concept in patients with ADHD have yielded mixed results.

Thus, the goal of the present thesis was to investigate whether children and adults with ADHD are able to make accurate judgments of their self-regulatory skills. To that aim, we first developed and evaluated a new age-appropriate instrument of metacognitive knowledge of self-regulatory skills in young children – the SelfReg –, which demonstrated to be a valid and sensitive instrument. In a next step, the accuracy of self-perceptions of children with ADHD on this new age-appropriate instrument was analyzed. Accuracy of self-perceptions in adults with ADHD was examined by means of existing self-report inventories assessing cognitive and executive deficits in everyday situations, and compared them to those of adults without ADHD.

Consistent with the hypothesis, results indicated that children and adults with ADHD are able to provide accurate self-perceptions when tested with an ecologically valid and appropriate instrument. In accordance with previous findings assessing the self-concept of patients with ADHD, adults with ADHD presented with significantly lower self-concepts compared to controls. Of note, findings persisted even when controlling for possible confounding depressive symptoms. However, effect sizes in study 2, investigating children with ADHD, indicated a tendency toward a positive bias after all, when children with ADHD were compared to controls.

Therefore, an additional exploratory cluster analysis was performed. Results offered evidence for characteristic overestimation as well as for underestimation or accurate estimation of skills in different subgroups of children with ADHD. Children belonging to the "positive bias" group were slightly younger and tended to have lower IQ scores than other children with ADHD. This finding was in accordance with the "meta-cognitive deficit" explanation of inflated self-perceptions (e.g. Poissant, 2005), but in contrast to recent studies claiming that inflated self-perceptions persist in ADHD over the years (Hoza et al. 2010). Finally, the study provided further support for the findings of previous studies postulating greater predictive power of behavioural questionnaires over executive function test in the assessment of executive impairments in daily life of patients with ADHD.

However, the results should also be considered in the context of some limitations. The findings suggest that over- and underestimation of self-regulatory skills is not universal to ADHD, but may be restricted to a distinct subgroup of ADHD patients whose special characteristics and developmental risks remain to be fully described. Therefore, further research with larger samples is warranted to determine whether this association exists in different populations with different levels of executive function and self-awareness. In the majority of cases, however, self-reports from patients with ADHD, assessed with ecologically valid and age-appropriate instruments such as the SelfReg, seem to constitute reliable and important source of information for clinical intervention.

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1. Introduction

Attention deficit hyperactivity disorder (ADHD) is one of the most frequently diagnosed childhood disorders, occurring in approximately 5% of the world's population (Polanczyk et al. 2007). Children receiving a diagnosis of ADHD display persistent levels of inattentive and/or hyperactive and impulsive behaviour that is developmentally inappropriate and causes significant impairment across situations (DSM-IV American Psychiatric Association, 2000). ADHD was initially considered a childhood disorder, the symptoms of which would substantially decline, or even completely remit, with time. Today, however, it is generally agreed that ADHD persists into adulthood (Faraone et al. 2006; Rasmussen & Gillberg, 2000). ADHD is associated with considerable social, family, behavioural and cognitive dysfunction and is comorbid with depression, anxiety, bipolar disorder, and substance use (McIntosh et al. 2009). Children with ADHD display a large variety of difficulties in everyday life, such as academic underachievement (LeFever et al. 2002; Loe & Feldman, 2007), behavioural problems (e.g. Barkley, 1997; Steinhausen et al. 2003), and social deficits (McQuade & Hoza, 2008).

This accumulation of negative experiences has an impact on therapy-relevant factors such as the individual's self-concept and self-perceptions of competence (Newark & Stieglitz, 2010), which in turn may advocate maladaptive coping strategies. The majority of research in ADHD has focused on those features that are easily observable and disruptive to others (e.g. difficult peer relationships, aggressive behaviour). Less attention has been paid to internal features, such as self-concept and self-perceptions of competence. Research regarding the social and psychosocial factors associated with ADHD, and how these factors may affect the self-evaluations of children with this disorder, has yielded conflicting results. Some researchers suggest that children with externalising disorders such as ADHD are poor informants of their own behaviour due to their difficulties with self-reflection and self-evaluation (Zucker et al. 2002). Studies have found that despite having chronic functional problems in different areas, many children with ADHD tend to under-report the presence of these problems (Hoza et al. 2002, 2004; Evangelista et al. 2008). They posit the presence of an interesting phenomenon called the positive illusory bias (PIB) in children with ADHD (Evangelista et al. 2008;

Diener & Milich, 1997; Hoza et al. 2002, 2004; Ohan & Johnston, 2002; Owens & Hoza, 2003). Conversely, some studies indicate that children with ADHD perceive their difficulties quite accurately (e.g. Barber et al. 2005; Bell et al. 2010; Klimkeit et al. 2006; Treuting & Hinshaw, 2001). Furthermore, there are related findings of lowered self-esteem in patients with ADHD (Sawyer et al. 2002; Edbom et al. 2006; Ramsay & Rostain, 2008; Newark & Stieglitz, 2010; Bramham & Young, 2009; Philipsen et al. 2007).

In consequence, the nature of self-perceptions and self-concept in children with ADHD remains a topic of controversy. Given that the disorder persists in up to 50% of children with ADHD into adulthood (Biederman et al. 1996; Faraone, 2000, 2004a, 2004b), it remains unclear whether eventual inaccurate self-perceptions (positive or negative) are something children with ADHD eventually outgrow, or whether they remain into adolescence and adulthood. Some studies suggest that self-perceptions of adults with ADHD are more valid than those of children (Adler et al. 2008; Kooij et al. 2008; Zucker et al. 2002; Mannuzza et al. 2002).

It was within the scope of the present thesis to investigate the accuracy of self-perceptions and the self-concepts of children and adults with ADHD. To this aim, we developed a new age-appropriate self-rating scale – the Selfrating of Self-Regulatory Functions (SelfReg) - which was validated on a representative sample of normally developing children. Subsequently, we compared self-ratings on the SelfReg in children with and without ADHD aged 8 to 10 years. The self-perceptions and self-concepts of adults with ADHD were assessed by means of existing self-report inventories and compared to those of adults without ADHD.

The following theoretical introduction section is dedicated to self-perceptions and the self-concept in children with ADHD. First, methodologies for studying the PIB in children with ADHD are reviewed, followed, secondly, by a summary of different theoretical explanations for inflated self-perceptions in ADHD and, thirdly, a summary of ADHD and its assessment in adulthood including current studies examining the PIB in adults with ADHD are presented. Fourthly, self-regulation as a core feature of ADHD is introduced and a short overview of existing self-report inventories of self-regulation is given. Fifthly, the objectives of the thesis are introduced.

The main part of the present thesis comprises three studies relating to the assessment and examination of self-perceptions of self-regulatory skills and self-concept in children and adults with ADHD. In the final chapter, the summarised results of these studies are evaluated and the use of self-rating scales in the assessment of children and adults with ADHD is discussed.

2. ADHD in childhood

ADHD is associated with a variety of difficulties in everyday life impacting therapy-relevant factors, such as self-concept and self-perceptions of competence (Newark & Stieglitz, 2010). To date, research has provided conflicting results regarding the nature of self-perceptions and self-concept in children with ADHD. Among children and adolescents with ADHD, boys are overrepresented (Puura et al. 1998; Smalley et al. 2007), and the syndrome expression seems to present certain gender specific aspects (Ramtekkar et al. 2010).

2.1. The clinical syndrome of ADHD

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; APA, 1994), the diagnosis of ADHD requires pervasive inattentive or hyperactive-impulsive symptoms, or both, that are displayed to a developmentally inappropriate extent. The onset of the symptoms should be before the age of 7, and they should persist for at least 6 months. Although many of the ADHD symptoms can be evident in all children and adults, individuals diagnosed with ADHD experience the symptoms with greater severity than their peers (Barkley, 2006, p. 77).

Behaviours associated with inattention include making careless mistakes in schoolwork, difficulty sustaining attention in tasks, not listening when spoken to directly, not following through on instructions, difficulty organising tasks, reluctance to engage in tasks that require sustained mental effort, high distractibility, and forgetfulness (APA, 2000, p. 92). Behaviours associated with hyperactivity/impulsivity include often fidgeting or squirming, often leaving the seat in classroom or

other situations in which the child is expected to remain seated, running or climbing excessively in situations in which it is inappropriate, having difficulty playing quietly, acting as if *"driven by a motor,"* talking excessively, blurting out answers before questions have been completed, having difficulty awaiting turn, and interrupting or intruding on others (APA, 2000, p. 92).

According to the revised DSM-IV-TR (APA, 2000), there are three subtypes of ADHD: 1) ADHD predominantly inattentive type (6 or more symptoms of inattention and fewer than 6 symptoms of hyperactivity-impulsivity), 2) ADHD predominantly hyperactive/impulsive type (6 or more symptoms of hyperactivity-impulsivity and fewer than 6 symptoms of inattention), and 3) ADHD combined type (6 or more symptoms of inattention and 6 or more symptoms of hyperactivity-impulsivity).

It is estimated that around 60–100% of patients with ADHD also exhibit one or more comorbid disorders (Gillberg et al. 2004), which often continue into adulthood (Biederman 2004; Kessler et al. 2006). Approximately 40–90% of patients meet criteria for Oppositional Defiant Disorder (ODD) and/or Conduct Disorder (CD) (Angold et al. 1999; Bauermeister et al. 2007; Gillberg et al. 2004; Jensen et al. 1997), disorders characterised by externalising behavioural problems, such as aggressive behaviour, difficulty with authority (ODD) or lying, stealing, and vandalism (CD). Furthermore, around 13–51% of ADHD patients suffer from internalising disorders, such as anxiety or depression (Angold et al. 1999; Bauermeister et al. 2007; Gillberg et al. 2004; Jensen et al. 1997). Currently, the DSM-IV (APA 1994) rules out a diagnosis of autistic disorder with ADHD. Nevertheless, a large percentage (65–80%) of children with ADHD portrays symptoms in the autistic spectrum (Clark et al. 1999; Gillberg et al. 2004). Other disorders frequently observed in patients with ADHD are dyslexia (25–40%), motor coordination problems (50%), dyscalculia (10–60%), sleep disorders (25–50%), and enuresis and/or encopresis (30%) (Gillberg et al. 2004; Owens & Hoza 2003; Willcutt et al. 2005). Compared to ADHD patients without comorbid problems, ADHD patients with comorbidities appear to have a more severe form of ADHD, are often more impaired in their daily functioning, and have a poorer long-term prognosis (Bauermeister et al. 2007; Biederman et al. 1996; Connor et al. 2003; Gillberg et al. 2004).

According to Biederman & Faraone (2005), hypotheses about the cause of ADHD have evolved from simple one-cause theories to the view that ADHD is a complex, multifactorial disorder caused by the confluence of many different types of risk factors (i.e. genetic biological, pathophysiology, environmental, psychosocial), with each make small contributions to the increasing vulnerability to the disorder through their additive and interactive effects. No one causal factor is necessary or sufficient to initiate the disorder and all these factors are interchangeable. Biederman and Faraone (2005) point out that this multifactorial view of ADHD is consistent with the recorded heterogeneity in its pathophysiology and clinical expression.

ADHD is associated with significant impairment of cognitive and psychosocial functioning (Barkley, 2002; Biederman & Faraone, 2005; Steinhausen, 2010) and quality of life in patients and their families (Klassen et al. 2004; Matza et al. 2004; Sawyer et al. 2002). So far, research has mainly focussed on observable external features of the disorder. Little attention has been paid to internal features, such as self-concept and self-perceptions of competence, which may be negatively impacted by the multiple negative experiences made by children with ADHD due to their functional impairments. Some researchers in the field of ADHD in childhood suggest that despite these chronic functional problems in different areas, many children with ADHD tend to under-report the presence of these problems (e.g. Hoza et al. 2010; Evangelista et al. 2008; Vaughn, 2007; Mikami et al. 2010; see Owens et al. 2007 for a review), and possess comparable global self-concept to children without ADHD (e.g. Dumas & Pelletier, 1999; Ljusberg & Brodin, 2007). On the other hand, some studies report accurate self-perceptions of competence in children with ADHD (e.g. Barber et al. 2005; Klimkeit et al. 2006; see Owens et al. 2007), who are reported to have lower global self-concept and lower specific domain self-concept than children without ADHD (Bussing et al. 2000; Ialongo et al. 1994).

2.2. Self-perceptions and self-concept in children with ADHD

The concept of self-esteem *"is proposed to be internalised during the same developmental period as when ADHD is generally diagnosed and treated"* (Bussing et al. 2000, p. 1260). A child's self-

concept goes through a major transition at the age of 8 or 9 years (Barber et al. 2005). Around this age, children have developed both global and domain-specific evaluations of their self-worth (Harter, 1982). The different pathways in the development of self-esteem are significantly related to highly relevant domains to children, such as peer relationships, school performance, and behaviour problems (Zimmermann et al. 1997). For school-aged children, social isolation and rejection are devastating because children at this age are undergoing rapid changes in the development of their own value and self-worth (Wong et al. 1999); the wider the discrepancy between the importance of a specific domain and the actual competence of the individual, the lower the level of self-esteem (Harter, 1993).

Since children with ADHD show deficits in multiple areas of their lives, one might expect that they would present with low self-esteem and low perceptions of self-competence. Yet, research so far has provided opposing evidence. In the next section, the methodologies in assessing the PIB in children with ADHD as well as the strengths and weaknesses of each approach will be discussed.

2.3. Methodologies for studying self-perceptions in children with ADHD

Three different methods have been employed to examine the self-perceptions of children with ADHD. A first method compares the self-reports of children with ADHD with those of controls, examining differences in absolute self-perception scores between these two groups. A second technique consists in comparing ADHD and control children's anticipatory and retrospective self-ratings of competence before and after a specific performance task and then relating these self-ratings to the actual performance. A third method compares discrepancies between child reports of competence and reports of competence made by others who know the child well (e.g. teachers or parents), for both groups. The latter two methods represent a methodological improvement over the first method in that they include an external criteria. A detailed description of studies that use these three techniques in order of their methodological strength (i.e. studies with weaker methodologies are presented first) will be described in the following sections.

2.3.1. Absolute self-perceptions

Early studies compared the absolute levels of self-perceptions of competence between samples of children with ADHD and control children, in the absence of an objective criterion (i.e. test performance, parent or teacher ratings).

Much groundwork for studies examining the self-perceptions in ADHD has been laid by Hoza et al. (1993). In this study the self-perceptions of 27 boys with ADHD were compared to those of 25 boys without ADHD. Children completed the 'Self-Perception Profile for Children' (SPPC; Harter, 1985) a widely used scale measuring the general and componential aspects of self-esteem in children. The SPPC contains 36-items covering five domains (scholastic competence, social acceptance, athletic competence, physical appearance, and behavioural conduct), and a generalised self-perception denominated global self-worth. Higher scores on this 4-point scale indicate greater self-perceived competence. Except for the behavioural domain, in which controls reported higher competency than the ADHD group, the two groups did not differ on any of the other subscales. Children with ADHD did not differ from controls in their self-ratings despite the presence of academic and social impairment. Once internalization symptoms were controlled, additional analyses revealed that ADHD boys did not view themselves as any less competent or less well-behaved than their normal peers. They actually viewed themselves more positively in other domains compared to peers (Hoza et al. 1993).

Similarly, Bussing et al. (2000) assessed self-esteem among 143 students at high risk for ADHD with the 'Piers-Harris Self-Concept Scale', one of the most widely used measures of psychological health in children and adolescents. The scale is composed of 60 items covering six subscales (physical appearance and attributes, intellectual and school status, happiness and satisfaction, freedom from anxiety, behavioural adjustment and popularity). Overall, self-esteem scores were in the normal range. This finding is especially remarkable because children in this study qualified for special education services due to emotional handicaps or learning disabilities, both of which are considered additional risk factors for lower self-esteem (Beltempo and Achille, 1990). However, across ADHD comorbidity profiles, children with ADHD and internalising symptoms had

significantly lower self-esteem scores, especially in the areas of anxiety and popularity, compared to children with ADHD alone or those with comorbid disruptive behaviour disorders (Bussing et al. 2000).

In contrast to studies indicating that boys with ADHD have generally overly inflated self-esteem, other studies (e.g. Treuting & Hinshaw, 2001; Barber et al. 2005; Klimkeit et al. 2006; Ialongo et al. 1994; Dumas & Pelletier, 1999) found that children with ADHD are able to perceive their difficulties quite accurately. For example, Treuting and Hinshaw (2001) divided 7- to 12-year-old boys with ADHD into subgroups by aggressive status, to examine whether they would show higher rates of depressive symptomatology and lower levels for self-esteem than comparison boys. Aggressive boys with ADHD reported more symptoms of depression than did non-aggressive boys with ADHD, who in turn, reported more depression than did comparison boys. Aggressive boys with ADHD showed lower levels of self-esteem than did non-aggressive ADHD or comparison boys.

A further study (Barber et al. 2005) compared the self-perceptions of 38 children with ADHD with those of 39 children without ADHD. The children completed the SPPC. The ADHD group had a significantly lower overall score and a lower score on the behavioural conduct subscale compared with children without ADHD. Klimkeit et al. (2006) used a new rating scale, the 'Self-Evaluation Scale for Children', to investigate how children with ADHD rate their behaviours compared to children without ADHD. Sixty-five children with and without ADHD participated in this study (mean age 9 years, 8 months). Compared to children without ADHD, children with ADHD reported more disorganised, disruptive and impulsive behaviours, poorer self-perception, and poorer social and communication skills, indicating that they were able to provide useful information about their feelings and behaviours and are more self-aware than previously thought. In Klimkeit et al's study children with ADHD did not report any less interest in school activities or more anxiety than the children without ADHD.

Ialongo et al. (1994) conducted a double blind study on the effects of psychostimulant medication on 48 children with ADHD aged 7 to 11 years. Regardless of medication status, ADHD children reported significantly lower scholastic competence, behavioural conduct and global self-

worth than non-ADHD children. In addition, non-medicated ADHD children reported lower social acceptance than non-ADHD children.

Similar to Ialongo et al. (1994), Dumas and Pelletier (1999) found in a sample of children aged 6 to 11 years (57 with ADHD and 59 controls) that all dimensions of self-perception in the SPPC were lower among children with ADHD, except for athletic competence, which was higher. Children with ADHD scored significantly lower on the scholastic competence, social acceptance, and behavioural conduct subscales of the SPPC as controls. However, unlike Ialongo et al. (1994), Dumas and Pelletier (1999) did not find a significant difference on the global self-worth subscale between the two groups.

Overall, studies examining the absolute self-perceptions of children with ADHD have generated mixed results. Of note, the presence of the PIB is not necessarily determined by more positive self-perceptions of children with ADHD relative to control children. Studies claim a PIB when no group differences emerge. This method is one of the weaker methodologies for exploring the PIB. The real competencies of children are not objectively established. Furthermore the method relies on the assumption that children with ADHD have marked impairments in the life domains for which they provide self-ratings. Even though this might be a reasonable assumption, without a basis for comparison, studies utilising absolute self-rating scores only indirectly measure the PIB. The congruence between children's perceptions and actual competence remains unidentified. Furthermore, as Owens et al. (2007) suggest, these contradictory findings may be partially due to the fact that some studies did control (e.g. Hoza et al. 1993) and others did not control for internalising symptoms (e.g. Ialongo et al. 1994). Comorbid depression may mitigate the inflated self-perceptions found in this population, such that youth with ADHD and depression do not have negative biases but rather show no PIB, similar to typically developing, non-depressed youth (Hoza et al. 2002, 2004). There is some evidence to support that comorbid mood problems are quite relevant to findings about self-perceptions in children with ADHD (Hoza et al. 2002; 2004). In these studies, symptoms of depression seem to be associated with more modest self-evaluations (e.g. Hoza et al. 2002). The effect of comorbid mood problems will be discussed in more detail in section 2.3.4..

2.3.2. Pre- task predictions, post-performance evaluations, and actual performance

In an attempt to improve the methodological validity to determine the presence of a PIB, other studies employed pre-task self-predictions and/or post-task self-evaluations in light of information on actual performance. More specifically, children have to perform a certain activity. Before and/or after the activity they are asked for ratings of their performance. This method represents an improvement over the more indirect comparisons of absolute ratings. It allows for the measurement of actual performance in the particular sample of interest. However, a drawback of this technique is that the domains of competence to be investigated are limited to specific tasks rather than generalised areas. As an example, participants are asked to rate themselves with respect to a particular situation (e.g., how well one will be able to solve a puzzle), but the methodology is more difficult to use with respect to more general domains of functioning (e.g. one's ability to maintain social relationships). It is more difficult to construct a task that would measure performance in such a broad area in a way that maps onto the child's self-ratings.

Despite of these methodological challenges, several studies have employed pre- and/or post-task self-reports compared to actual performance information. For instance, Whalen et al. (1991) asked boys between 7 and 13 years of age to predict their performance on a word-search task. They found that 80% of boys with ADHD anticipated perfect performance in comparison to only 43% of controls. This difference in expectations resulted statistically significant. Unfortunately, no data existed on the actual performance of children on these tasks. Similarly, Milich and Okazaki (1991) used pre-task predictions and actual performance to examine the PIB in 9- to 11-year-old children in the academic domain. They asked boys with ADHD to indicate how well they thought they would perform when solving wordsearch puzzles. Boys with ADHD had significant difficulties with this task in comparison to boys without ADHD, despite reporting more optimistic expectations of their performance. Interestingly, in spite of their optimism regarding puzzle-solving, boys with ADHD reported greater frustration during the task. In addition, they gave up on significantly more puzzles than controls.

O'Neill and Douglas (1991) asked 11-year-olds to predict their performance on a story recall task. Children with ADHD were compared to two control groups. One consisted of children with reading disabilities and one comprised typically-developing children. The two control groups were equivalent in terms of the optimism of their predictions whereas boys with ADHD made significantly more positive predictions. However, despite these more positive predictions, boys with ADHD exerted less effort, used less elaborate strategies, and spent less time studying during the story recall task than typically-developing children. The presence of two control groups let the researchers conclude that the PIB was specific to child ADHD populations.

In Ohan's and Johnston's (2002) study, 7- to 12-year-old boys with and without ADHD had to complete a maze task (academic task) and interact with a confederate teacher (social task). Before they performed the tasks, children answered questions regarding how well they expected to do on the mazes and how much they thought the teacher would like them. After completion of the task they estimated their performance on the mazes and how much the teacher had liked them. Boys with ADHD and boys without ADHD did not significantly differ for either the pre-task predictions or the post-task estimates. Yet, the overall maze performance of boys with ADHD was significantly lower than the performance of those without ADHD in terms of number of out-of-boundary marks, dead-end entries, and mazes failed. Furthermore, teachers' estimates of liking the boy were significantly lower for boys with ADHD compared to those without ADHD.

Hoza et al. (2000) asked 7- to 13-year-old boys with and without ADHD to estimate their performance on a social interaction task. Participants were instructed to get a similarly-aged confederate to both like them and to want to go to a camp (or school). Performance was manipulated with the help of the confederate, insofar as each child participated in a successful and an unsuccessful social interaction. Although boys with ADHD were rated as less socially competent than controls across both success and failure situations by objective observers, their subsequent performance self-evaluations were significantly better than boys without ADHD. This overestimation was most evident after experiencing a failed social interaction.

Hoza et al. (2001) expanded upon the previous study (Hoza et al. 2000) by examining children's self-evaluations of performance in the context of success and failure experiences in the academic domain (i.e., find-a-word puzzles). The authors found that boys with ADHD were less likely than boys without ADHD to persist, to use effort, or to come up with puzzle solutions. However, their subsequent self-evaluations of performance differed not significantly from the self-evaluations of boys without ADHD. Furthermore, both boys with and without ADHD had similar pre-task predictions of performance. Boys with ADHD provided overly optimistic reports of their own performance.

In sum, the studies described in this section overall support the existence of the PIB and represent a methodological improvement over using absolute self-perceptions scores in the absence of a criterion. However, this methodology may not fully capture more generalised domains of competence.

2.3.3. Discrepancy and criterion analysis

The use of discrepancy scores between a self-rating and an objective criterion (e.g., a standardised achievement measure) represents an additional methodological improvement over the use of absolute self-perceptions. Yet, it is often difficult to find an appropriate criterion measure that captures the essence of the behaviour of interest (e.g. objective task for the measurement of social competence). A useful proxy for an objective criterion in determining whether a PIB exists with respect to perceptions of broader domains of functioning is the use of others' ratings of the child's performance as the criterion to which a child's own ratings are compared.

In this methodology, difference scores are calculated by subtracting a criterion score (e.g. parent report) from the child's self-report of competence. Difference scores are subsequently compared between children with and without ADHD. Mother, father, and teacher reports of competence across multiple domains have been used across studies as comparison criteria, and scores on standardised academic achievement tests.

Hoza et al. (2002) compared self- and other-reports to assess the PIB in boys aged 7 to 13 years of age using Harter's (1985) SPPC. Teachers, as well as boys with and without ADHD, filled out the questionnaire and their reports were compared. Relative to teacher report, boys with ADHD overestimated their academic, behavioural, and social abilities to a greater degree than did control boys.

More recently, Hoza et al. (2004) examined the self-perceptions of 7- to 10-year-olds with ADHD regarding the scholastic, social, athletic, appearance, and behavioural domains. Using Harter's (1985) SPPC, they compared the self-ratings of children to others' ratings (children, mothers, fathers, and teachers). This study is the first to assess the PIB using ratings from different informants. Results indicated that, regardless of the informant, a PIB existed in both boys and girls with ADHD relative to controls. This study supported the existence of the PIB for children with ADHD and demonstrated consistency in results by showing that this effect was robust across multiple raters, ruling out potential rater bias on the part of teachers as an explanation for the phenomenon.

To date, the only authors investigating the role of ADHD subtype, predominantly Inattentive Type [IA] versus Hyperactive/Impulsive and /or Combined Types [HICB], in self-perceptions of competence in the academic domain have been Owens and Hoza (2003). They employed a discrepancy analysis. Teacher report and standardised achievement tests represented the assessment criterion. When maths and reading achievement scores were used as the assessment criterion boys and girls in the HICB group overestimated their scholastic competence more than control boys. In contrast, boys and girls in the IA group provided more congruent estimates of their own academic competence. Regression analyses indicated that greater overestimation of scholastic competence was related to more severe Hyperactive/impulsive symptoms, but not with more severe inattentive symptoms, suggesting that children in the IA group were not simply overlooking their underperformance due to attention problems (Owens & Hoza, 2003).

One major concern in using discrepancy scores to calculate the PIB is that it may result in floor or ceiling effects (Owens et al. 2007). Due to the true impairments on the part of children with

ADHD, the criterion scores (e.g. actual achievement scores) will almost certainly be much lower for children with ADHD than for control children (Owens et al. 2007). As a result, it is much easier for children with ADHD to overestimate their competence compared to control children (i.e. the potential "gap" is much larger for children with ADHD) (Owens et al. 2007). Similarly, there may be a ceiling effect for control children in that they may not be able to mathematically overestimate their competence if their score on the competence criterion is already high (Owens et al. 2007). A further concern is that the reliability of a difference score is typically substantially lower than the reliabilities of the variables employed to construct the discrepancy - as a result of combined measurement error (Edwards, 2001), this increases likelihood of making a Type II error (Owens et al. 2007). Finally, difference scores have a tendency to be strongly and systematically correlated with their components (e.g. Cronbach, 1958; Zuckerman & Knee, 1996).

Although there are limitations to using discrepancy analysis, the alternatives also have significant limitations. Thus, De Los Reyes and Kazdin (2004) recommend that researchers employ standardised discrepancy scores when conducting evaluations of children's self-perceptions.

In sum, the majority of studies claiming a positive bias in the self-estimation of ADHD children have been based on scales assessing general self-concepts in academic, physical, social or other domains and using different types of measures such as social interactions, puzzles, or ratings on scales including Harter's (1985) SPPC, the Piers-Harris Self-Concept Scale (Piers & Harris, 1969), and the Self-Evaluation Scale for Children (Klimkeit et al. 2006). Comparisons of absolute self-ratings and discrepancy scores have generally found effects in the academic, social, athletic competence, physical appearance, and behavioural domains, whereas comparisons of pre- and post-task predictions along with performance data have found inflated self-perceptions for tasks within the academic and social domains.

Specific self-report scales for children with ADHD based on DSM-IV-criteria, which ask for ADHD-related problems and typical situations, have been shown to correlate with parents' ratings (e.g. Görtz et al. 2002) and, thus, provide evidence that children and adolescents with ADHD are at least partly aware of their problems. However, these scales are likely to be less appropriate when it

comes to the investigation of biased self-perception, because they are specific to ADHD and may produce floor effects in non-affected children. In addition, most ADHD self-report scales are designed for older children and adolescents, i.e. from the age of 11 years on, probably due to the fact that questionnaires relating to abstract verbal concept are too difficult to be understood by younger children. This latter point is also true for the majority of scales relating to self-regulatory function (see section 4.3.).

2.3.4. Self-perceptions of children with ADHD and comorbid disorders

In a number of the above-mentioned studies, researchers examined the PIB among children with ADHD in comparison to children without ADHD, while also controlling comorbid disorders (Hoza et al. 1993; 2002; 2004; Treuting & Hinshaw, 2001). Other studies have shown that children with ADHD and comorbid low achievement overestimate their self-perceptions most in the academic domain, whilst children with ADHD and comorbid aggression overestimate their self-perceptions most in the behavioural conduct domain (Hoza et al. 2004). These findings led Hoza and colleagues to conclude that (a) children with ADHD overestimate their competence the most in their domain of greatest deficit and (b) low achievement and aggression maintains or exacerbates the PIB in children with ADHD. The latter conclusion is consistent with studies that have found positive illusory self-perceptions in children with a learning disability (LD; e.g., Heath & Glen, 2005) and children with aggression (e.g., Edens, 1999).

In contrast to comorbid low achievement and aggression, children with ADHD and comorbid depression demonstrate lower self-perceptions of competence (Hoza et al. 2004). This is consistent with the plethora of research on the self-perceptions of non-ADHD children with depression: multiple studies have found that children with depression provide low self-perceptions of competence across multiple domains (e.g., Asarnow & Bates, 1988; McGrath & Repetti, 2002).

However, there is a methodological weakness in controlling for comorbidities. For example, attempting to control for internalising symptoms essentially results in a “pure” group of ADHD boys

characterised by externalising symptoms only. Even though comorbid internalising symptoms are not found in all children with ADHD, nonetheless internalising symptoms show a relatively high prevalence rate in this population, with some estimates of comorbidity as high as 17 to 30 percent in childhood (Barkley, 1998). Future studies should bear this potential limitation in mind, when controlling for comorbidities.

2.4. Theoretical explanations for the positive illusory bias (PIB) in ADHD

2.4.1. Self-protection

The self-protective hypothesis states that children attempt to hide their incompetencies by inflating reports of self-competence in order to prevent feelings of failure or inadequacy (Diener & Milich, 1997) and to protect their self-image. This explanation is consistent with Hoza et al. (2004; 2002), who found that children with ADHD overestimated their competence the most in the domain of greates deficit. Additional support for the self-protective hypothesis is provided by Evangelista et al. (2008), who found that children with ADHD inflated reports of their own competence, but not the competence of others, suggesting that children with ADHD do not inflate their perceptions of others' competence because there is no reason to protect another's image.

Three studies have directly tested the self-protective hypothesis in children with ADHD and provided inconsistent findings (Diener & Milich, 1997; Ohan & Johnston, 2002; Evangelista, 2009). Both, Diener and Milich (1997) and Ohan and Johnston (2002) revealed that boys with ADHD who received positive feedback significantly decreased their estimates of social competence compared to boys with ADHD who received no feedback. Conversely, non-impaired control boys demonstrated the exact opposite pattern. They increased their estimates of social competence with feedback, and decreasing it without feedback. This pattern of results suggests that the need to self-protect has been reduced, when boys with ADHD receive positive feedback, and therefore, their estimates of social competence may becomes better aligned with their actual performance. These results indicate that

children with ADHD adjust their self-ratings based on feedback and, in case of negative feedback, engage in self-protection.

Of note, while support for the self-protective hypothesis has been found for children with ADHD in the social domain, support is lacking in the academic domain. Ohan & Johnston (2002) did not find that children with ADHD exhibited a self-protective PIB when performing an academic task. In contrast, Heath and Glen (2005) found support for self-protection in the academic domain for children with LD. These studies used different methodologies - Ohan and Johnston (2002) used a maze task, whereas Heath and Glen (2005) used a spelling task. Evangelista (2009) assumes that children may have not found the maze task to be challenging, thus the task was not threatening and did not invoke self-protection. The author further questions whether the maze task was not such an ecologically valid academic task as the spelling task; if children with ADHD did not feel threatened (i.e., they may have viewed the maze task as a game), then they would not feel the need to boast their self-perceptions.

Evangelista et al. (2009) intended to improve upon the methodology of previous studies that tested the self-protective hypothesis (Diener & Milich, 1997; Ohan & Johnston, 2002), by using a more ecologically valid academic task, and evaluating self-protection across multiple domains. For the purpose of this study the SPPC (Harter, 1985) and the reading subtests of the Wechsler Individual Achievement Test, 2nd edition (WIAT-II). (Wechsler, 2002) were administered because reading difficulties are highly prevalent in children with ADHD (DuPaul & Stoner, 2003). Surprisingly, results did not support the self-protective hypothesis across any domain; support for self-protection was not found in the social domain, which is inconsistent with the hypotheses and previous research (Diener & Milich, 1997; Ohan & Johnston, 2002), or in the academic domain, which is consistent with Ohan and Johnston's (2002) findings.

Hoza et al. (2010) evaluated the relative utility of the self-protective perspective in explaining the PIB of children with ADHD, using a developmental psychopathology framework. Specifically, they explored developmental change in social and behavioural positive self-perceptual bias in both children with ADHD and comparison children. Consistent with the self-protective

explanation of positively biased self-views, trajectories of change differed substantially by domain. Across a 6-year time span (8- to 13 years of age), comparison children exhibited less bias than children with ADHD, although a normative bolstering of social self-views during early adolescence was observed. ADHD status moderated the dynamic association between biases and adjustment. Decreases in positive biases regarding social and behavioural competence were associated with increases in depressive symptoms over time. Increases in positively biased behavioural self-perceptions were more strongly associated with increases in aggressive behaviour in children with ADHD than among the comparison sample. Hoza et al. (2010) suggested that these findings are consistent with the hypothesis that emotional reactions to negative appraisals may be especially likely to result in aggressive outbursts (Baumeister et al. 1996); children with ADHD may be especially prone to this vulnerability given their impaired emotion regulation capacities (Hoza et al. 2010)

2.4.2. Metacognitive deficits

Another possible explanation for the PIB illusory bias in ADHD children is in relation to metacognitive abilities (Poissant, 2005; Cornoldi et al. 1999). Metacognition refers to self-knowledge about cognitive processes, self-assessment of ongoing processes (monitoring), and self-regulation that is based on such assessments (Nelson & Narens, 1990). Self-regulation is a dynamic aspect of metacognition (Poissant, 2004); the experiences, feelings, and thoughts that occur during an ongoing cognitive activity give the individual an internal feedback about the efficiency of their mental monitoring. Generally, adults, and to a lesser extent children, are able to consciously use rules and strategies to solve a problem. This ability is impaired in poor learners (Lockl & Schneider, 2003). Social psychology research (Kruger & Dunning, 1999; 2002) has proposed that poor performers demonstrate deficits in judging relative performance because of their poorer metacognitive skills. They posit that poor performers tend to overestimate their abilities as a result of their inability to recognise their deficits, precisely because they are incompetent and lack skills in this domain. In support of this hypothesis, children with ADHD overestimate their competence the most in their

domain(s) of greatest deficit (Hoza et al. 2002; 2004). Kruger and Dunning (1999; 2002) propose that an improvement of participants' metacognitive skills leads to an increase of the accuracy of their self-perceptions.

Studies examining metacognitive abilities in children with ADHD have found significant differences between children with and without ADHD (e.g. Poissant, 2005; Cornoldi et al. 1999). Furthermore, Poissant et al. (2004) observed a significant difference in meta-comprehension between younger and the older ADHD subjects, which could not be found between younger and older control subjects. The authors interpreted this difference in meta-comprehension performance between ADHD and control groups in terms of a "developmental delay" in the children with ADHD, rather than a "deficit".

2.4.3. Deficits in error detection

Finally, several studies have shown that children with ADHD are less aware of errors. The ability to detect and correct errors is critical to adaptive control of behaviour. It has been postulated that error awareness may represent an important cognitive and physiological phenotype in ADHD (O'Connell et al. 2009). A number of studies have highlighted that ADHD is associated with abnormalities in behavioural and neural responsiveness to performance errors. Children with ADHD usually make significantly more errors than the control group, but are less likely to consciously detect these errors (O'Connel et al. 2009). In neuropsychological tasks, they do not slow down response speed after commission errors, in contrast to normal control children (Schachar et al. 2004; O'Connel et al. 2009). This finding has been linked to abnormal fronto-striatal network function, especially to dysfunction of the anterior cingulate cortex (Liotti et al. 2005; Albrecht et al. 2008). Alteration in error monitoring could result in inconsistent, inaccurate, and poorly regulated behaviour as well as deficits in self-regulated learning (Schachar et al. 2004).

In sum, different theoretical explanations have been put forward to explain the tendency of ADHD patients to overestimate their competence (for a review see Owens et al. 2007). However, the

function and causes of this phenomenon remain unclear. To date, the self-protective hypothesis has garnered more empirical support than any other explanation for the PIB in children with ADHD. Nonetheless, because inconsistencies and methodological limitations remain, additional investigation and extension to other domains of competence is warranted (Owens et al. 2007). Furthermore, given that the disorder persists in up to 50% of children with ADHD into adulthood (Biederman et al. 1996; Faraone, 2000; 2004a; 2004b), it remains unclear whether eventual inaccurate self-perceptions (positive or negative) are something children with ADHD eventually outgrow, or whether they remain into adolescence and adulthood. Some studies suggest that self-perceptions of adults with ADHD have proven more valid than those of children (Adler et al. 2008; Kooij et al. 2008; Zucker et al. 2002; Mannuzza et al. 2002).

Findings of the previously mentioned study by Hoza et al. (2010), however, indicate that the PIB persists from childhood into adolescence. Children with ADHD displayed large and consistently positive biases across the 6-year period examined. However, they did not find as large a developmental increase for children with ADHD as they did for controls. Positively biased self-perceptions of large magnitude were already evident for children with ADHD by age 8, and remained to a similar extent over the 6-year period.

3. ADHD in adults

ADHD is a chronic disorder, as the majority of children with ADHD continue to struggle with their symptoms into adolescence and adulthood (Biederman et al. 2008; Faraone, 2000; 2004a; 2004b Faraone et al. 2006; Nylander et al. 2009; Halmoy et al. 2009; Wilens et al. 2002; Fischer et al. 2005; Clarke et al. 2005; Wodushek & Neumann, 2003). As children with ADHD grow towards adolescence and adulthood, the hyperactivity tends to diminish (Clarke et al. 2005), but impulsivity and concentration difficulties tend to persist (Wodushek & Neumann, 2003). Although in some cases the symptoms of ADHD may appear to diminish during adolescence, this does not mean that functioning is unimpaired. In a follow-up study, symptom levels seemed to be lower than in

childhood but 90% of participants with ADHD still did not function well (Biederman et al. 2000). A current meta-analysis indicates that the persistence of ADHD into adulthood greatly depends on "what definition of persistence" one uses (Faraone et al. 2006, p. 163). Specifically, researchers note that although only approximately 15% of children with ADHD meet full DSM-IV criteria at age 25, approximately 65% meet criteria when diagnosed with ADHD in partial remission (Faraone et al. 2006). At first glance, these data indicate that ADHD remits over time; however, Faraone et al. (2006) caution that the current DSM-IV diagnosis of ADHD may not be developmentally sensitive to adults.

Fayyad et al. (2007), conducted an epidemiological study of adult ADHD in ten countries in the Americas, Europe and the Middle East. Their prevalence estimates ranged from 1.2 to 7.3%, with an average of 3.4%. The prevalence was lower in lower income (1.9%) compared with higher income countries (4.2%). Consistent with other studies, in this study ADHD was associated with psychiatric comorbidity and functional impairment. Comorbidity in adults is the rule, with 76% of clinical patients having at least one other disorder, and with a mean of three psychiatric comorbidities (Kooij et al. 2004). Mood, anxiety, sleep, personality and substance use disorders are found. (Kessler, 2007; Kessler et al. 2006; Barkley et al. 2008; Kooij et al. 2001; Murphy & Barkley, 1996; 2002; Biederman, 2004; Ramussen et al. 2001; Heiligenstein et al. 1999). In adults with ADHD, gambling and other addictions are very common (Goossensen et al. 2006; Wilens & Fusillo, 2007; Fayyad et al. 2007; Breyer et al. 2009).

Adults with ADHD experience lifetime mood lability with frequent highs and lows, and short-fuse temper outbursts (Wender et al. 2001; Asherson, 2005; Kooij, 2006; Skirrow et al. 2009). Typically, adults with ADHD will change and/or lose jobs and relationships, without being able to settle after the age of 30 (Kookj et al. 2010). They are usually underachievers (Biederman et al. 2008; de Graaf et al. 2008; Bakely & Gordon, 2002), are more likely to be subject to all kinds of accidents (e.g. car accidents, burns), and display an unhealthy lifestyle (e.g. smoking, alcohol and drug abuse; riskier sexual lifestyle) (Swensen et al. 2004; Gau et al. 2007; Barkley, 2002; Ohlmeier et al. 2007). Criminality in adulthood is predicted by ADHD and comorbid conduct disorder in childhood,

particularly with substance abuse and antisocial personality disorder in adulthood (Kooij et al. 2010). Ramsay and Rostain (2008) posit that this accumulation of negative experiences affects the formation of the individual's self-esteem and self-efficacy. There are related findings on poor self-esteem in patients with ADHD (Sawyer et al. 2002; Edbom et al. 2006), although research addressing this relationship has yielded conflicting results (Hoza et al. 1993).

Despite of substantial impairment across the lifespan (Halmoy et al. 2009; Nylander et al. 2009; Biederman, 2005; Fischer et al. 2005), it is not uncommon to find adults self-referring for an ADHD evaluation without having been diagnosed in childhood. Some data suggest that only 25 % of adults with ADHD had been diagnosed in childhood or adolescence. An additional reason for underdiagnosis of ADHD includes the frequent presence of comorbid psychiatric syndromes, which in clinical practice may be identified as the primary or only diagnosis (Kooij et al. 2010). Since ADHD is increasingly well accepted the number of adults seeking clinical services for ADHD will likely continue to increase.

3.1. Assessment of ADHD in adults

ADHD often presents as an impairing lifelong condition in adults, yet it is currently underdiagnosed and treated. Since the recognition of ADHD is relatively recent throughout most countries there are many adults with ADHD who were never diagnosed or treated for ADHD when they were children (McCarthy et al. 2009). Another reason for underdiagnosis of ADHD adults is the age-dependent change in the presentation of ADHD symptoms. Symptoms such as hyperactivity and impulsivity in childhood often become less obvious in adulthood. A shift to more subtle symptoms such as inner restlessness, inattention, disorganisation, and to impairment in behaviours related to executive functioning can be observed (Biederman et al. 2000; McCarthy et al. 2009; Wender et al. 2001; Kooij et al. 2001; Fischer et al. 2005). Additional reasons for underdiagnosis of ADHD include the frequent presence of comorbid psychiatric syndromes, which in clinical practice may be identified a s the primary or only diagnosis (Kooij et al. 2010). The European Network Adult ADHD has recently

published recommendations for a better diagnostic assessment and treatment of adults with ADHD (Kooij et al. 2010). They put forward that diagnosis should include extensive psychiatric work-up including detailed account of the developmental history, both current and retrospective account of ADHD symptoms and impairment and associated co-morbidities, before starting treatment. Finally, to prevent underreporting of symptoms, external validation is desirable by collecting information from relevant informants. When both self and other-reports of ADHD symptoms are gathered, it seems best to combine the ratings of the self and other-reports by creating an average, composite score of the two sources of information. Such an action is consistent with the way in which children are diagnosed with ADHD using combined parent and teacher reports, and with the recommendations for diagnosis of ADHD in adults (McGough & Barkley, 2004).

3.2. Studies examining the PIB in adults with ADHD

To date, few studies have investigated the accuracy of self-perceptions in adults with ADHD with ambiguous results. Jiang (2010) examined the PIB in adult women with differing levels of ADHD symptoms in seven domains of functioning. Ninety one women with varying levels of ADHD symptoms completed a self-perception questionnaire inquiring about their sociability, intimate relationships, work competence, household management, intelligence, nurturance, and parenting. Others who knew the women well completed the same questionnaire with regard to the women. Standardized discrepancy scores between the women and other raters were used to index the women's over-estimations of their competence. A composite score of the women's ADHD symptoms (based on the women's and others' reports) was not significantly related to the PIB in any domain. However, when the women's self-reports and other raters' reports were examined separately, other raters' reports were significantly positively associated with the PIB while women's self-reports of ADHD symptoms were significantly negatively correlated with the PIB. These findings suggest the existence of the PIB in estimating competence among women with high levels of ADHD symptoms, at least when ADHD symptoms are assessed by other adults.

Knouse et al. (2005) examined the accuracy of self-perceptions of driving behaviour in adults with ADHD. Men were asked to report on their driving behaviour. Subsequently their driving performance was observed both in a naturalistic setting and in a driving simulator. Adults with ADHD had a greater number of speeding tickets, driving citations, collisions, in their driving histories, compared to those without ADHD. Furthermore, they demonstrated more unsafe driving behaviours in both simulated and natural settings than those without ADHD. Despite these impairments, adults with ADHD gave self-assessments of driving that were comparable to controls. Therefore, this study provides evidence of the PIB in adults in the context of driving. Conversely, in a further study, Knouse et al. (2006) found no PIBs in adults with ADHD in the context of judgments about prospective memory. They analyzed the relative accuracy of adults with and without ADHD. They found that the two groups were equivalent in terms of the magnitude and accuracy of their judgments of their future memory. These results suggest that adults with ADHD can make reasonably accurate judgments about their future memory and therefore do not overestimate their performance in this area.

This finding is line with two other studies addressing the accuracy of self-perceptions related to functional outcomes associated with executive function deficits in adults with ADHD. Barkley and Murphy (2010), examined the relative utility of the two different methods of assessing executive functions (self-ratings vs. tests) in their capacity to predict impairment in occupational functioning in adults with ADHD. They reported that self-ratings were found to contribute significantly to all 11 occupational impairment measures assessed in their study, e.g. self-rated work quality, the percentage of jobs in which these adults had experienced various behavioural and interpersonal problems or had been fired, employer ratings of overall work performance and impairment across a variety of work contexts, and clinician ratings of social and occupational adjustment. Similarly, Biederman et al. (2007) investigated the predictions of self-ratings of functional outcomes in adults with ADHD. As hypothesised, high scores on the self-ratings scale were associated with significant negative functional outcomes in adults with ADHD. Furthermore, they found a subgroup of individuals at significant risk for functional morbidity beyond that conferred by the diagnosis of ADHD alone, presenting significantly more comorbid psychiatric disorders.

Given the sparseness of studies examining the accuracy of self-perceptions in adults with ADHD, to date little is known about the PIB in adults with symptoms of ADHD.

4. Self-regulation: A core feature of ADHD

Self-regulation has been implicated in prominent theories of ADHD (Sergeant, 2000; Barkley, 1997; 2006) and is continuing to be in the centre of research while single, core deficit models are viewed as insufficient to understand this heterogeneous disorder (Nigg, 2006; Pennington, 2006; Wilcutt et al. 2005). Processing of contextual demands and ongoing monitoring of one's behaviour when it is suboptimal are components of self-regulation (Shiels & Hawk, 2010). It has been argued that repeated difficulties in regulating behaviour in learning situations and interactions with others may result in a child to developing negative self-images, which in turn may result in a decrease of motivation, self-fulfilling prophecy as a poor self-regulator and school failure (Blair & Diamond, 2008). Therefore, early assessment and intervention promoting self-regulation, accurate self-perception and metacognitive skills are crucial.

Self-regulation has been studied from many different scientific points of view (see the monograph by Baumeister & Vohs, 2004; for reviews of the different concepts see Cole et al. 2004; Kochanska et al. 2000; Welsh, 2002). In clinical research, deficient self-regulation is considered as one of the core features of several psychopathological syndromes of childhood, particularly of ADHD (Barkley, 1997, 2006). In temperament research, self-regulation has been linked to processes that modulate reactivity, including effortful control of behaviour based on the executive function system (Rothbart et al. 2004). Educational psychology researchers have increasingly focused on the role of self-regulatory skills in students' academic functioning (Ponitz et al. 2008; Blair & Razza, 2007). Evidence is accumulating that the primary sources of children's difficulties during the first years at school are self-regulatory difficulties rather than poor academic skills (e.g. Blair & Diamond, 2008; Zimmermann, 2001).

4.1. Self-regulation and executive functions: the overlap of concepts

Blair and Diamond (2008) define self-regulation as *"a primarily volitional cognitive and behavioural process through which an individual maintains levels of emotional, motivational, and cognitive arousal that are conductive to positive adjustment and adaptation, as reflected in positive social relationships, productivity, achievement, and a positive sense of self."* Most researchers concur that self-regulatory skills encompass a cognitive as well as an emotional/motivational dimension that closely interact (Zeidner et al. 2000; Schunk & Ermter, 2000; Brooks, 1997; see Blair & Diamond 2008, see the monograph by Baumeister & Vohs, 2004). The concept of self-regulation shows considerable overlap with the neuropsychological construct of executive functions, in particular with models that comprise *"hot"* (ie. emotional/motivational) as well as *"cold"* (i.e. cognitive) executive functions (Hongwanishkul et al. 2005; Kerr & Zelazo, 2004). More traditional concepts of EF have focused mainly on the *"cold"* executive functions, including cognitive subcomponents such as working memory, inhibition, shifting, goal-setting, planning, monitoring, attentional control and others (for reviews see Anderson, 2008; Eslinger, 1996; Levin & Hanten, 2005).

4.2. Self-perception of self-regulatory skills

Self-regulation is significantly influenced by the child's self-perceptions of regulatory skills. In an educational context, the process which enables students to coordinate the use of current knowledge and a repertoire of reflective strategies in order to accomplish a goal has been referred to as metacognition (see section 2.2.3.) (Palincsar & Brown, 1987). From an executive function perspective, metacognition can be related to monitoring, i.e. the control of ongoing task processing and of its result, as well as to self-awareness (see Stuss, 1991), and to planning/problem-solving, which encompass a subcomponent of appropriate strategy selection. *"Metacognition"* has also been used in a divergent meaning as a superordinate term for *"cool"* executive functions in the Behaviour Inventory of Executive Function (BRIEF) (Gioia et al. 2000; see Denckla, 2007 for a critique).

Accurate self-perceptions of competence have been described as essential aspects of mental health (DuBois & Sliverthorn, 2004; Colvin et al. 1995). A limited degree of bias in self-perceptions may be both normative (Harter, 1999; Alicke & Govorun, 2005) and adaptive (Mazur et al. 1999; Taylor et al. 2000). In contrast, more extreme, unrealistic, positive self-perceptions, such as the PIB found in children with ADHD, are maladaptive and less typical (Owens et al. 2007; Baumeister et al. 2000; Costello & Dunaway, 2003). In contrast to the adaptiveness of normal positive self-illusions, the positive illusions of children with ADHD are not advantageous in that they are not correlated with improved persistence, motivation, or performance at a task (Hoza et al. 2001). In fact, studies suggest that the positive self-perceptions of children with ADHD bear no relation to the performance behaviour of these children (Milich & Okazaki, 1991), and that their PIBs may actually make children with ADHD more likely to fail, due to their inability to recognise the need to improve by making use of negative feedback.

Positive bias in self-perceptions has the potential to contribute to problematic adjustment through several mechanisms, including poor social skills due to overconfidence and limited self-awareness, negative reactions to perceived challenges to self-views, and decreased adaptive efforts such as goal-setting (Baumeister et al. 2000; Colvin et al. 1995). On the other hand, a negative bias in self-perception has been described as of particular concern in the pathway of ADHD, as it is thought to mediate other adverse outcomes, such as depression, deviant peer choices, or substance abuse (Moore et al. 1996; Gordon & Caltabiano, 1996). This type of bias may contribute to a more generalised negative cognitive style or schema, in which personal events and experiences are subject to distorted interpretations, thus leading the individual to be susceptible to emotional difficulties such as depression and anxiety (Hoffman et al. 2000; Mazur et al. 1999). Generally, inaccurate estimations of self-competence may interfere with treatment progress, as they prevent children with ADHD from acknowledging the full extent of their impairments and their need to engage in treatment. For example, Mikami et al. (2010) found that inflated self-perceptions of competence in children with ADHD predict poorer response to treatment, as measured by changes in observed conduct problems, peer-nominated social preference, and friendships. Accordingly, awareness of one's own deficits in ADHD seems therefore vital for adherence to treatment (Hoza & Pelham, 1995). Gaining a better

understanding of the self-views of children with ADHD will allow to design more beneficial treatment interventions, focusing rather on a cognitive approach than on a strictly behavioural one. There is suggestive evidence for the beneficial treatment effect of cognitive interventions focusing on strengthening cortical (executive) function, using techniques such as cognitive remediation therapy in children (O'Connell et al. 2006; Butnik, 2005) and metacognitive training in adults (Solanto et al. 2010).

5. Objectives of the study

The main aim of the present study was to investigate the accuracy of self-perceptions in children and adults with ADHD. As the literature review has revealed a lack of age-appropriate self-assessment tools for younger school children, we first sought to develop a new self-report scale of self-regulatory skills – the Self-rating of Self-Regulatory Function (SelfReg) - for children aged 8-10 years. This development was based on the assumption that children younger than 10 years old are able to make accurate judgments on self-regulatory functions, as long as items are presented in an age-appropriate form. According to current concepts of self-regulation, the SelfReg should encompass a subcomponent related to behavioural/emotional regulation (emotion, motivation, motor activity, inhibition), and one addressing cognitive regulation (organisation/planning, monitoring, speed of processing, distractibility, sustained attention). In the SelfReg, items are presented as two opposites in story-like scenarios and children have to relate their own behaviour to that of other children. We hypothesised that relatively young children would be able to make accurate self-judgments on the SelfReg. Secondly, we examined the accuracy of self-perceptions of children with ADHD on this new age-appropriate instrument. Finally, we assessed the accuracy of self-perceptions as well as the self-concepts of adults with ADHD by means of existing self-report inventories assessing cognitive and executive deficits in everyday situations, and compared them to those of adults without ADHD.

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7. Self-Perceptions of Self-Regulatory Skills in Children aged eight to 10 Years: Development and Evaluation of a New Self-Rating Scale[1]

7.1. Abstract

Insufficient self-regulation and reduced awareness of self-regulatory skills have been discussed as possible explanations for academic difficulties. However, instruments for assessing metacognitive knowledge of self-regulation in young school children have been lacking so far and it has been questioned whether younger school children are able to make accurate self-judgments on their regulatory skills. We present a new age-appropriate self-rating scale for the assessment of self-regulatory skills in young school children – the Self-rating of Self-regulatory Function (SelfReg) – which was validated on a representative sample of 107 school children aged 8 to 10 years. Confirmatory factor analysis of the scale offered evidence for a one-dimensional rather than a multidimensional model. In a second step, self-ratings on the SelfReg of 21 children with impaired self-regulatory skills and various types of behavioural, developmental, or academic difficulties were compared to self-ratings of 21 normal controls. Children with dysfunctional self-regulation rated themselves as significantly more impaired on the SelfReg than control children. Analyses of discrepancies between parents' and/or teachers' ratings and self-ratings of the children did not discriminate between the two groups, indicating that self-ratings in children with dysfunctional self-regulation and control children, though significantly different, were equally accurate. It is concluded that children as young as 8 to 10 years are able to make differential and accurate judgments on their self-regulatory skills when assessed with an age-appropriate instrument.

Key words: Self-rating-scale, self-regulation, metacognition, executive functions, awareness

[1] Rizzo, P. Drechsler, R. & Steinhausen H.-Ch. (2010). Self-Perceptions of Self-Regulatory Skills in Children aged eight to 10 Years: Development and Evaluation of a New Self-Rating Scale

7.2. Introduction

The study of self-regulation has captured the interest of child development researchers from different scientific points of view (see the monograph by Baumeister & Vohs, 2004; for reviews of the different concepts see Cole et al. 2004; Kochanska et al. 2000; Welsh, 2002). According to the definition by Blair and Diamond (2008), self-regulation is "a primarily volitional cognitive and behavioural process through which an individual maintains levels of emotional, motivational, and cognitive arousal that are conducive to positive adjustment and adaptation, as reflected in positive social relationships, productivity, achievement, and a positive sense of self." Many researchers agree that self-regulatory skills enclose a cognitive and an emotional/motivational dimension (Zeidner et al. 2000; Schunk & Ermter, 2000; Brooks, 1997) which closely interact. Motivation is particularly important in tasks that demand sustained attention; delay of gratification may be needed when it comes to setting and maintaining a goal.

There is considerable overlap between the concept of self-regulation and the neuropsychological construct of executive function (EF), especially with models comprising "hot" executive functions, that is emotional-motivational aspects of self-regulation (Kerr & Zelazo, 2004; Zelazo & Müller, 2002), as well as "cold" executive functions. The latter refer to the more traditional concept of EF with cognitive subcomponents such as working memory, inhibition, shifting, goal-setting, planning, monitoring, attentional control, and others (for reviews see Anderson, 2008; Eslinger, 1996; Levin & Hanten, 2005). In temperament research, self-regulation has been linked to processes that modulate reactivity, including effortful control of behaviour based on the executive function system (Rothbart et al. 2004). From a clinical perspective, deficient self-regulation is considered as one of the core features of several psychopathological syndromes of childhood, especially of ADHD (Barkley, 1997; 2006). In educational psychology, researchers have increasingly focused on the role of self-regulatory skills in students' academic functioning (Ponitz et al. 2008; Blair & Razza, 2007). Evidence is accumulating for the primary sources of children's difficulties during the first years at school being self-regulatory difficulties and not poor academic skills as presumed (e.g. Blair & Diamond, 2008; Zimmermann, 2001).

Self-regulation is significantly influenced by children's self-perceptions of regulatory skills. In an educational context the process which enables students to coordinate the use of current knowledge and a repertoire of reflective strategies in order to accomplish a goal has been referred to as metacognition (Palincsar & Brown, 1987). Metacognition serves as a regulatory function and permits selecting, combining and coordinating strategies in an effective manner (Boekaerts, 1999), an ability that is impaired in poor learners (Lockl & Schneider, 2003). From an executive function perspective, metacognition can be related to monitoring, that is, the control of ongoing task processing and of its result, as well as to self-awareness (see Stuss, 1991), and to planning / problem-solving, which encompass a subcomponent of appropriate strategy selection. "Metacognition" has also been used in a divergent meaning as a superordinate term for "cool" executive functions in the Behavior Rating Inventory of Executive Function (BRIEF) (Gioia et al. 2000) (see Denckla, 2007 for a criticism).

Three general methods have been used to assess metacognitive knowledge of self-regulatory skills: interviews (Zimmermann & Martinez-Pons, 1988; Swanson, 1990), think aloud protocols (Cerro & Baker,1993; Garner & Alexander, 1982), and self-reports (Schraw & Dennison, 1994; Pereira-Laird & Deane, 1997) (for a detailed review see Schraw, 2000). Recent studies have turned to observing children's behaviours in naturalistic settings (Whitebread et al. 2005; Shamir et al. 2009). Self-report inventories, if methodological difficulties are considered, are in some ways the least problematic technique (see Sperling et al. 2002) as they are easily administered and scored. A number of different self-report inventories have been developed, focusing on metacognitive skills, such as the 'Metacognitive Awareness Inventory' (MAI) (Dennison et al. 1996), 'Motivated Strategies for Learning Questionnaire' (MSLQ) (Pintrich et al. 1991), the 'Learning and Study Strategies Inventory' (LASSI)" (Weinstein et al. 1987), and the students' surveys from the Metacognitive Awareness System (MetaCOG, Meltzer et al. 2004). Other instruments focus on behavioural and cognitive self-regulation ('Strength and Difficulty Questionnaire-Self report', Goodman et al. 1998; 'Conners-Wells Adolescent Self-Report Scale', Conners & Wells, 1997), or on executive functions ('Behavior Rating Inventory of Executive Function- Self Report Version' BRIEF-SR) for children and adolescents aged 11- to 18 years (Guy et al. 2005).

Most of these inventories have been designed for older children and adolescents, probably due to the fact that questionnaires relating to abstract verbal concept are too difficult to be understood by younger children. Furthermore, it may be questioned whether metacognitive knowledge of self-regulatory skills is sufficiently developed in young school children to permit the assessment of differentiated profiles. A majority of studies indicates that metacognitive skills emerge at the age of 8 to 10 years and develop thereafter (e.g. Veenman et al. 2006, Lockl & Schneider, 2006), but metacognitive behaviours have also been described in children as young as three (e.g. planning, reflection) (Whitebread et al. 2005). Research indicates that the younger children are, the more they overestimate their competences in various domains (Helmke, 1998; Jacobs et al. 2002). Experiments with children aged up to eight years indicate little convergence between children's self-judgments of learning strategies and their real approach in relevant learning situations (see Artelt, 1999; 2000).

In addition, some disabilities in the area of executive function may be difficult to be perceived by affected children because this requires precisely those monitoring skills which are potentially impaired. This phenomenon has been observed in adults with frontal lobe dysfunction (Prigatano & Altmann, 1990; Hart et al. 2004; Schmitz et al. 2006). Studies of self-perception in children with ADHD and/or learning disabilities have yielded mixed results. Several studies indicate inflated self-ratings of self-concepts in affected children (Vaughn et al. 1992; Vaughn, 2007; Dyson, 2003; Gresham et al. 2000; Stone & May, 2002; Heath & Glen, 2005; see Owens et al. 2007 for a review). These results are often based on the analysis of discrepancy scores, calculated by subtracting a criterion (e.g. parent report) from the child's report of self-competence, with large differences indicating overestimations by the child (see Gresham et al. 1998; Hoza et al. 2002; Hoza et al. 2004; Owens & Hoza , 2003; Diener & Milich, 1997). In these studies, however, self-reports of affected children usually do not differ from those of controls.

In contrast, several other studies report that young children with various types of behavioural, developmental or academic difficulties, which may lead to negative feedback from teachers and parents, are quite well aware of their problems and have a clear notion of being different and less apt

than their peers (Chapman, 1998; Bear et al. 2002; Zeleke, 2004; Treuting & Hinshaw, 2001; Ialongo et al. 1994; see Hoza et al. 2002 for a review). It has been argued that repeated difficulties in regulating behaviour in learning situations and interactions with others may result in a child to developing negative self-images, which in turn may result in a decrease of motivation, self-fulfilling prophecy as a poor self-regulator, and school failure (Blair & Diamond, 2008). Therefore, early assessment and intervention promoting self-regulation, accurate self-perception and metacognitive skills are crucial.

The aim of the present study was to develop and to evaluate an instrument for the assessment of metacognitive knowledge of regulatory functions in school children. We hypothesized that young school children are able to rate self-regulatory skills accurately when items are presented in an ecologically valid and age-appropriate form (see Schneider & Lockl, 2002). To that aim we developed a new self-rating instrument, the Self-rating of Self-regulatory Function (SelfReg). Instead of relating to abstract verbal statements, children compare their own behaviour to that of others in concrete daily-life scenarios. In accordance with certain models of EF / self-regulation (e.g. Kerr & Zelazo, 2004), we expected to find an underlying two-factorial scale structure, one factor encompassing cognitive aspects, the other factor comprising behavioural / emotional aspects of self-regulatory skills (study 1). We further assumed that when comparing their behaviour to that of other children on the SelfReg, a majority of children with dysfunctional self-regulatory skills would be able to report their problems accurately (study 2).

7.3. Study 1: Construction and validation of the SelfReg

We describe the construction process of the Self-rating of Self-regulatory Function (SelfReg), its first evaluation on a sample of school children (construction sample), the ensuing reduction of items, and the validation of the definitive scale on a second sample of school children (validation sample).

7.3.1. Construction of the SelfReg

7.3.1.1. Method

SelfReg: Items and scales were derived from reviews and experimental studies on executive function and self-regulation in children and from the examination of existing rating scales. In creating item content, we considered the following criteria. 1) It had to be part of children's everyday experience (ecological validity). 2) It had to be transferable into concrete situations. 3) The content had to reflect the underlying construct unambiguously (content validity).

In a first step, all created items were rated by four experts (teachers, child psychologists) for developmental appropriateness, comprehensiveness, adequacy of the situations described, and appropriateness of the survey instructions. The experts' appraisal of the instrument overall was positive and suggestions (e.g., wording) were integrated into the survey. Out of an initial pool of 112 items the SelfReg-preform was developed, comprising the following 9 subscales: emotion (11 items), motivation (12 items), motor activity (15 items), inhibition (12 items), organization/planning (12 items), monitoring (12 items), speed of processing (10 items), distractibility (14 items), and sustained attention (14 items).

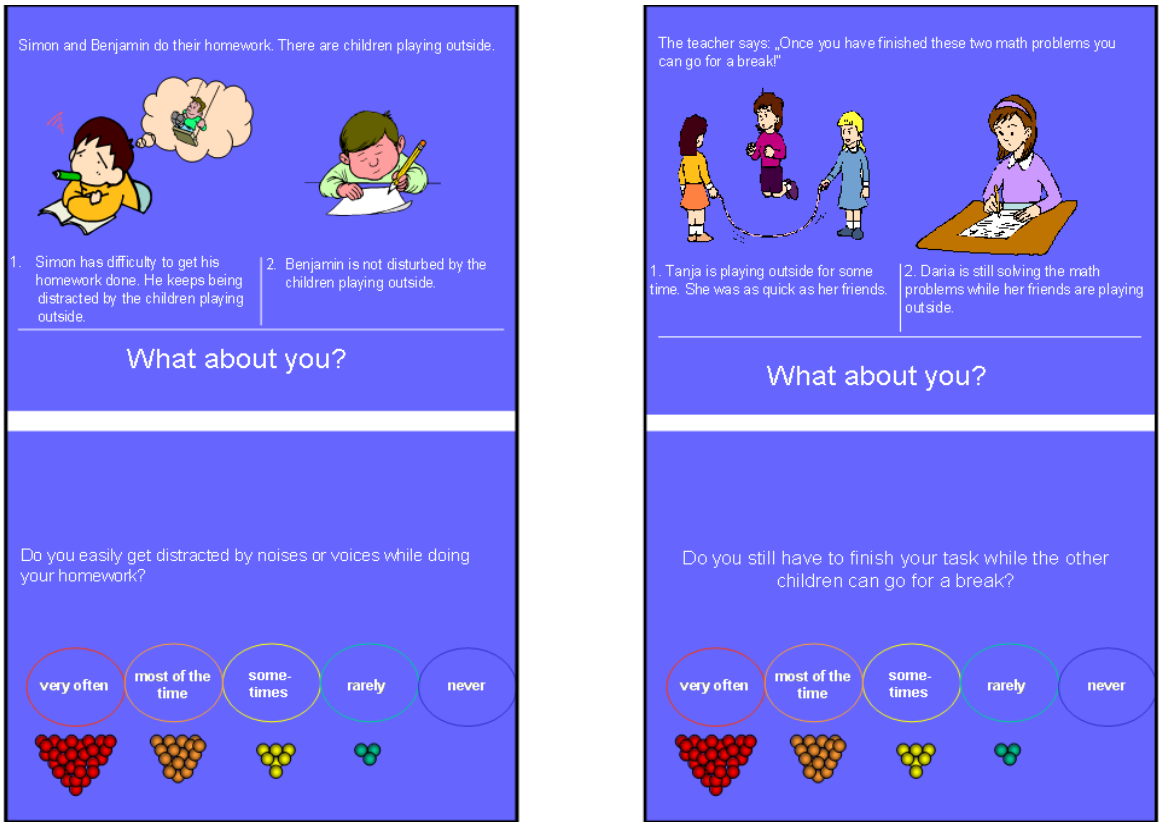
The SelfReg was subdivided into two main scales encompassing behavioural/emotional regulation (emotion, motivation, motor activity, inhibition), and cognitive regulation (organization/planning, monitoring, speed of processing, distractibility, sustained attention). In this model, "inhibition" was ascribed to the behavioural domain, following the segmentation of the BRIEF-subscales (Gioia et al. 2000), though inhibition may include both an emotional as well as a cognitive aspect and can be attributed to either one. Table 1 displays the scale structure of the SelfReg-preform (112 items) and the SelfReg definitive version (28 items).

Table 1. *Preform and definitive scale structure of the SelfReg*

Preform	No. of Items	Definitive Form	No. of Items
Behavioural Regulation		**Behavioural Regulation**	
Emotion	11	Emotion	4
Motivation	12	Motivation	4
Motor Activity	15	Motor Activity	4
Inhibition	12	Inhibition	4
Cognitive Regulation		**Cognitive Regulation**	
Organization/Planning	12		
Monitoring	12		
Speed of Processing	10	Speed of Processing	4
Distractibility	14	Distractibility	4
Sustained Attention	14	Sustained Attention	4
Total	**112**	**Total**	**28**

Each item begins with the description of a typical everyday situation, followed by two ensuing opposing types of behaviour shown by children: One example of good regulatory skills and one of poor self-regulation. Starting with "what about you?" the child is then asked whether he or she is likely to show the same behaviour as in one of the presented alternatives (for an example see Figure 1). To facilitate understanding and enhance motivation the situations are illustrated by pictures. For the same reasons and to facilitate scoring, items are presented on a computer-screen and responses are collected in a response box. However, an equivalent paper-pencil-form of the instrument is also available. The items in the computerized version are presented randomly. The texts are read aloud by the experimenter. A boys' and a girls' version were created for each item, with gender-specific pictures and names. To avoid one-sided answers, half of the items are formulated negatively. Answers are given on a 5-point Likert-scale ranging from 1 (= very often) to 5 (= never). The child enters the answer on a 5-button response box. Items of the definitive form are listed in the appendix.

Figure 1. *Item examples of the SelfReg*



Additional instruments: Children's Intelligence (IQ) was measured individually by a short form of the German version of the revised Wechsler Intelligence Scale for children (HAWIK-III), which includes the subtests Block Design, Picture Arrangement, Arithmetic, and Vocabulary (Schallberger, 2005).

Participants: The SelfReg-preform (112 Items) was tested in a sample of 50 school children aged 8 to 10 years recruited via public schools in the surrounding regions of the city of Zurich. Sample characteristics are shown in Table 2.

Table 2. *Description of the construction and validation sample*

	Construction Sample N=50		**Validation Sample N=107**	
Mean age (SD)	9.0 (0.7)		9.6 (0.6)	
IQ (SD)	108.8 (13.2)		108.3 (15.9)	
Boys / Girls		*p*		*p*
N	25 / 25		57 / 50	
Mean age (SD)	8.8 (0.7) / 9.1 (0.7)	*n.s.*	9.7 (0.6) / 9.6 (0.6)	*n.s.*
IQ (SD)	110.2 (11.2) / 107.5 (15.0)	*n.s.*	112.2 (15.6) / 105.0 (15.7)	*n.s.*

Note. SD = standard deviation; *n.s.*= not significant

Procedure: Due to the large number of items in the SelfReg-preform, the instruments (SelfReg-preform and short form of the HAWIK-III) were administered to all participants in three testing sessions. Items were presented in a random order. Sessions took place individually in a separate room at school.

Data Analysis: Reliability analysis based on Cronbach's coefficient alpha (Cronbach, 1951) was performed using SPSS 14. A first inclusion criterion was an item-remainder correlation of r_{it}>.40. Second, in order to meet brevity criteria, only those four items of each subscale with the highest internal consistency were included in the instrument. In the case of items with equivalent internal consistencies within one scale, we included those items which were closest with regard to content.

7.3.1.2. Results

As expected from a sample of unselected children, distributions of items were positively skewed, except for three items (skewness between -1.72 und -0.05, Kolmogorov-Smirnov-test: KS-test: p <.05). Two subscales (organizing/planning, monitoring) were excluded from subsequent analyses due to small item-remainder correlation of their scale items. The remaining scale items demonstrated good item-remainder correlations within scales with values ranging from .42 to .72 (see Table 3).

Table 3. *Descriptives of the definitive SelfReg (28 items) version (N=50)*

	Emotion	**Motivation**	**Motor Activity**	**Inhibition**	**Speed of Processing**	**Distractibility**	**Sustained Attention**
	M (SD) r_{it}	M (SD) r_{it}	M (SD) r_{it}	M (SD) rit	M (SD) rit	M (SD) r_{it}	M (SD) r_{it}
Item 1	4.2 (0.7) .60	3.8 (1.2) .53	3.9 (0.9) .66	3.8 (0.8) .47	3.9 (0.9) .50	3.6 (0.9) .49	3.6 (0.9) .62
Item 2	3.8 (0.7) .47	3.9 (0.8) .50	4.0 (0.9) .72	4.2 (0.9) .68	4.0 (0.8) .55	3.9 (0.8) .43	4.1 (0.8) .59
Item 3	4.1 (0.7) .55	4.2 (0.8) .54	3.9 (0.9) .69	3.8 (1.0) .61	3.9 (0.7) .64	3.9 (0.9) .42	4.2 (0.7) .60
Item 4	3.9 (0.8) .57	4.3 (0.7) .49	3.5 (1.2) .59	4.3 (1.0) .63	3.9 (0.8) .61	3.9 (0.8) .55	3.9 (0.9) .62
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
	α	α	α	α	α	α	α
Scale	16.2 (2.3)	16.3 (2.8)	15.4 (3.3)	16.2 (3.1)	15.8 (2.7)	15.4 (2.6)	16.0 (2.6)
	.75	.72	.83	.79	.77	.69	.79

Note. M = mean; SD = standard deviation; r_{it} item-remainder correlation; α = Cronbach's alphaThe whole reduction process resulted in the final version of the SelfReg with a total of 28 items (see Table 1). Descriptives of the SelfReg definitive version (28 items) are displayed in Table 3. Cronbach's alpha for both SelfReg (28 items) a priori main scales covering behavioural regulation and cognitive regulation was .88, demonstrating good homogeneity among the scale items. Internal consistency for the 7 subscales ranged from .69 to .83. The entire SelfReg showed good internal consistency with Cronbach's alpha coefficient of .92.

7.3.2. Validation of the SelfReg

In a second step, the 28-item version of the SelfReg was validated on a new sample of school children.

7.3.2.1. Method

Instruments: The definitive SelfReg (28 items) and the short form of the German adaptation of the WISC III (HAWIK III, Schallberger, 2005, see scale construction) were administered.

Participants: The validation sample consisted of 107 unselected schoolchildren aged 8 to 10 years. To ensure generalisability, 12 schools from different rural and urban school districts were selected covering a broad socioeconomic range and including students from a variety of social, ethnic, and economic backgrounds. No significant age or IQ difference was found for girls and boys (see Table 2 for sample characteristics).

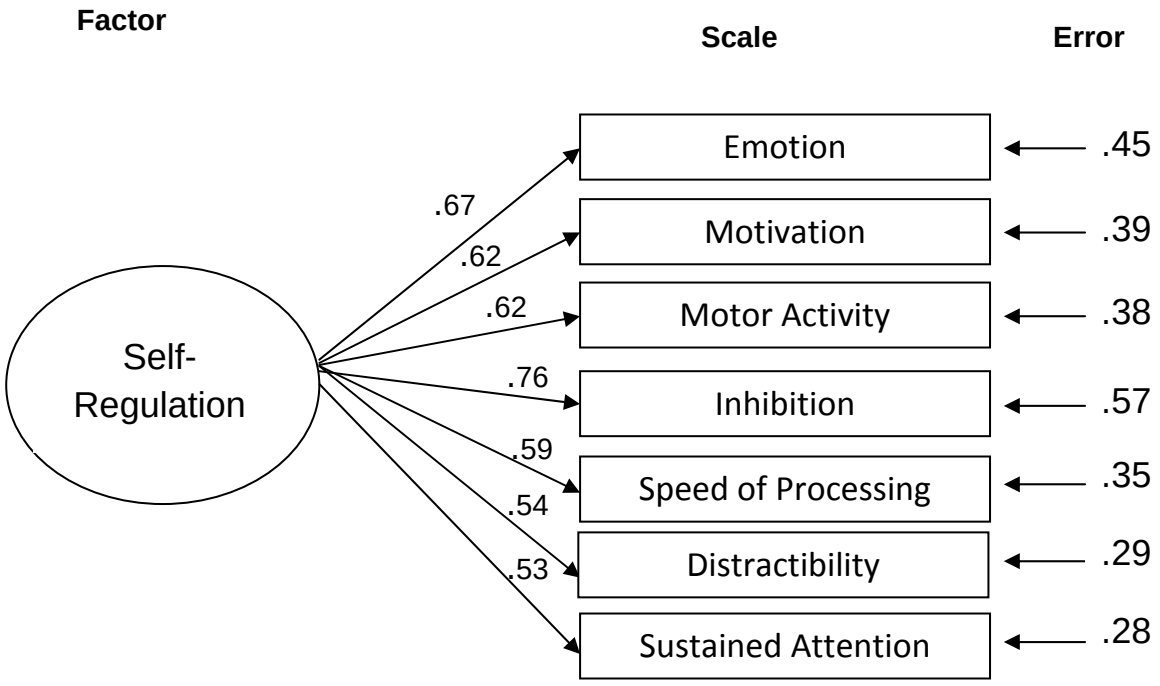
Procedure: The SelfReg (28 items) and IQ-tests were administered individually in a separate room of the schools. The administration of the SelfReg took approximately 15 to 20 minutes.

Data Analysis: A second reliability analysis was carried out with the SelfReg (28-items). A two-factorial scale structure with one factor encompassing behavioural aspects and the other factor comprising cognitive aspects of self-regulative skills was analyzed via maximum likelihood confirmatory factor analysis using the AMOS 6 program (Arbuckle & Wothke, 1999). The mean raw scores of the scales were entered as measured variables in the a priori postulated model. The confirmatory factor analyses were conducted on the covariance matrix as all SelfReg subscales share the same metric. The adequacy of fit was tested using Hu and Bentler's (1998, 1999) recommended approach to fit criteria: comparative fit index (CFI) .95, goodness of fit (GFI) .90, root mean squared error of approximation (RMSEA) .06 (=good) respectively .08 (=acceptable), X^2-value = *n.s.* and X^2/df ratio .5

7.3.2.2. Results

Cronbach's alpha for the Self-Reg (N=107; 28 items) was .84. The confirmatory factor analysis of the SelfReg showed that the a priori postulated two-factor model fitted the data poorly with a CFI of .561, a GFI of .791, a RMSEA of .228, X^2 = *n.s.,* and a X^2/df ratio of 6.17. Given the important overlap of the two latent factors (r=.76) a second CFA with one latent variable specified for the seven observed variables was considered. In this model, the seven scales (emotion, motivation, motor activity and inhibition, speed of processing, distractibility, and sustained attention) loaded on the latent single factor "self-regulation". The latent factor solution for the one-latent factor model is depicted in Figure 2. The correlations between the seven variables and the latent factor ranged between r=.54 and r=.76. The goodness of fit indices (CFI = .962, GFI = .944, RMSEA = .069, X^2 = *n.s.*, X^2/df ratio = 1.50) indicated a very good fit.

Figure 2. *Confirmatory factor analysis factor solution (N=107)*



7.4. Study 2: Self-ratings on the SelfReg by children with dysfunctional self-regulation compared to self-ratings by normal controls

7.4.1. Introduction

Self-ratings by children with dysfunctional self-regulatory skills (DSR) and various types of behavioural, developmental or academic difficulties on the SelfReg were compared to self-ratings by typically developing control children (CTL). We hypothesized that both groups would rate their self-regulatory skills accurately. In contrast to studies which described biased self-perceptions in clinical groups of children based on discrepancies between self-report and others' ratings (Gresham et al. 1998; Hoza et al. 2002; Hoza et al. 2004; Owens & Hoza, 2003; Diener & Milich, 1997), although the self-ratings raw scores of the children in the clinical group were similar to those of the control group, we expected to find the opposite pattern: children with impaired self-regulatory skills should rate themselves (accurately) as more impaired than control children. In consequence, discrepancy

scores between self- and parent-ratings should not discriminate between the groups.

7.4.2. Method

7.4.2.1. Instruments

The children's IQ was measured individually by the short form of the German version of the revised Wechsler Intelligence Scale for children (HAWIK-III) described in study 1. Children's parents completed the Behavior Rating Inventory of Executive Function (BRIEF, Gioia et al. 2000), the Strength & Difficulty Questionnaire (SDQ, Goodmann, 1999), as well as a short checklist on the child's regulation of motivation and speed of processing. This checklist had been created in order to collect parents' ratings that matched the subscales of the SelfReg. Teachers completed the teachers' version of the BRIEF (Gioia, et al. 2000).

7.4.2.2. Participants

The clinical sample included 21 children with dysfunctional self-regulation (DSR). Selection criteria were at least two out of four BRIEF main indices (BRIEF Parent Behavioral Index, BRIEF Parent Metacognition Index, BRIEF Teacher Behavioral Index, BRIEF Teacher Metacognition Index) within the clinical range (*T*-score≥60), with at least one elevated index score coming from the teacher's rating. In addition, children had to have been referred for behavioural, developmental and/or academic difficulties to specialized clinical psychologists or child psychiatrists.

One of the children had received the diagnosis of dyscalculia, five children had dyslexia, three were learning disabled, one child had a language development disorder, six children had attention-deficit/hyperactivity disorder, and five children had academic difficulties without any further diagnosis. CTL were selected from the validation sample and matched pairwise according to sex, age and IQ. Children with elevated scores (*T-score* > 60) on any of the four main BRIEF indices were excluded from the CTL. Children with DSR and CTL did not differ with reference to age, IQ and

gender distribution. Parents of all the children participating in the study gave written informed consent. Data collection was permitted by a research ethics committee.

7.4.2.3. Procedure

The SelfReg (28 items) and IQ-tests were administered individually in a separate room in the schools.

7.4.2.4. Data Analysis

For the analyses of group differences, all scores from negatively formulated items on the SelfReg were transformed before entering the analysis, so that low scores on the SelfReg indicate dysfunctional self-regulatory skills. A MANOVA was performed in order to analyze group differences between children with DSR and CTL on the SelfReg subscales. Post-hoc comparisons were analyzed by T-tests. Accuracy of self-perceptions was examined by comparing the self-perceptions of DSR and CTL relative to the parent's and teacher's perceptions. In order to achieve the same scaling of the parent and teacher scales (BRIEF parent and teacher, SDQ parent), negatively formulated items of the SelfReg were reversed in exclusively positively formulated items ranging from 1 = “very often” to 5 = “never” (high scores indicate more regulatory difficulties) and all data were *z*-transformed. Discrepancy scores were computed separately for each competence domain by subtracting the parent or teacher rating of the child from the child's self-rating. Larger difference scores indicate greater overestimation of competence on the part of the child. Group differences were compared by *T-tests*. Results are presented in Table 4.

Table 4. *Description and behavioral data of children with dysfunctional self-regulation (DSR, N=21) and controls (CTL, N=21)*

	DSR (N=21)	**CTL (N=21)**	*p*
Mean age (SD)	9.8 (0.7)	9.6 (0.5)	*n.s.*
Mean IQ (SD)	100.8 (21.5)	106.0 (9.7)	*n.s.*
Boys / Girls	15 / 6	15 / 6	*n.s.*
BRIEF Parents *(T-Scores)*			
Inhibit	51.7 (13.0)	42.0 (6.5)	0.01
Shift	52.1 (12.7)	44.6 (9.4)	0.05
Emotional Control	54.2 (13.0)	43.2 (7.1)	0.01
Initiate	55.8 (13.4)	45.2 (7.8)	0.01
Working Memory	61.8 (11.9)	44.1 (6.1)	0.001
Plan/Organize	61.1 (13.5)	42.7 (6.8)	0.001
Organization of Material	52.5 (13.7)	45.5 (8.2)	*n.s.*
Monitor	57.3 (12.3)	41.8 (6.6)	0.001
Behavioral Index	53.2 (13.4)	41.8 (5.5)	0.001
Metacognition Index	59.6 (13.2)	42.6 (5.9)	0.001
Global Executive Composite	57.5 (13.3)	42.1 (5.5)	0.001
BRIEF Teacher *(T-Scores)*			
Inhibit	66.8 (16.7)	47.0 (10.0)	0.001
Shift	64.3 (16.2)	51.1 (7.2)	0.01
Emotional Control	68.4 (19.6)	47.7 (3.0)	0.001
Initiate	65.0 (13.4)	51.5 (6.9)	0.001
Working Memory	71.3 (12.1)	49.8 (9.0)	0.001
Plan/Organize	66.3 (11.1)	51.0 (7.8)	0.001
Organization of Material	66.9 (22.7)	47.0 (7.2)	0.001
Monitor	69.4 (13.4)	50.7 (7.9)	0.001
Behavioral Index	68.4 (18.0)	47.8 (6.4)	0.001
Metacognition Index	70.2 (12.5)	49.9 (7.5)	0.001
Global Executive Composite Index	72.5 (16.2)	51.0 (9.7)	0.001
SDQ Parents *(Raw Scores)*			
Emotional Problems	2.8 (2.4)	1.2 (1.0)	0.01
Conduct Problems	2.2 (2.5)	1.1 (0.9)	*n.s.*
Hyperactivity	5.2 (2.2)	2.5 (1.7)	0.001
Peer Problems	2.5 (2.3)	1.1 (1.3)	0.05
Total Scale	12.8 (7.9)	6.6 (3.6)	0.01

Note. *n.s.*=not significant

7.4.3. Results

When comparing children with DSR (N=21) to CTR (N=21) (MANOVA: two groups by seven subscales) a significant main effect for group was found (F (0.52) = 4.32, p=.002). Post hoc tests indicated that children with DSR reported significantly lower self-perceptions of regulatory skills than controls across all the SelfReg subscales. Effect sizes (Cohen's d) ranged between 0.093 - 0.332. Results are presented in Table 5.

Table 5. *SelfReg subscale scores (raw scores) of children with dysfunctional self- regulation (DSR, N=21) and controls (CTL, N=21)*

SelfReg	**DSR (N=21)**		**CTL (N=21)**		**Multivariate Main Effect**	**Univariate Tests**		**Effect Size**
						F	***p***	
	M	**SD**	**M**	**SD**				
Emotional Control	13.4	3.2	15.2	2.7		4.11	*	. 093
Motor Activity	12.5	2.3	15.4	2.6	Wilks' Lambda	14.98	***	.272
Motivation	12.9	2.9	16.1	2.9	= .529	12.79	***	.242
Inhibition	12.7	3.3	16.8	2.5		19.88	***	.332
Speed of Processing	12.9	2.7	15.5	2.8	F = 4.328	9.44	**	.191
Distractibility	11.9	3.3	15.8	2.9	*p = .002*	15.73	***	.282
Sustained Attention	12.4	4.1	15.6	2.0		9.99	**	.200

Note. *** p<.001, ** p<.01; * p<.05

No significant difference emerged when comparing discrepancy scores of DSR and CTR. This finding indicates that in relation to parents' or teachers' ratings, self-ratings on the SelfReg of children with DSR are as accurate as those of controls. Results of discrepancy analyses are shown in Table 6.

Table 6. *Comparison of discrepancy scores (self vs. parents'/teachers' ratings, z-scores) of children with dysfunctional self-regulation (DSR, N=21) and controls (CTL, N=21)*

Compared Scales	DSR (N=21)	CTL (N=21)	*p*
SelfReg and parent BRIEF			
Emotion– Emotional Control	-.131 (1.31)	.131 (1.06)	*n.s.*
Inhibition – Inhibit	.073 (1.70)	-.073 (0.96)	*n.s.*
Distractibility – Working Memory	-.217 (1.22)	.217 (0.77)	*n.s.*
Distractibility – Shift	.173 (1.66)	-.173 (1.25)	*n.s.*
SelfReg and teacher BRIEF			
Emotion– Emotional control	-.299 (1.18)	.299 (0.90)	*n.s.*
Inhibition– Inhibit	-.176 (1.50)	.176 (0.79)	*n.s.*
Distractibility – Working Memory	-.273 (1.19)	.273 (0.90)	*n.s.*
Distractibility- Shift	-.012 (1.16)	.012 (1.11)	*n.s.*
SelfReg and parent SDQ			
Motor Activity – Hyperactivity	-.105 (1.27)	.105 (1.06)	*n.s.*
Distractibility – Hyperactivity	-.285 (1.49)	.285 (0.52)	*n.s.*
Sustained attention - Hyperactivity	-.137 (1.63)	.137 (0.55)	*n.s.*
SelfReg and equivalent parent items			
Motivation – Motivation	-.042 (0.97)	.042 (1.20)	*n.s.*
Speed of Processing – Speed of Processing	.113 (1.16)	-.113 (1.20)	*n.s.*

Note. *n.s.*= not significant; as a consequence of equal sample sizes and z-transformation, both discrepancy score group means are of equal size with opposite algebraic signs. The magnitude of the discrepancy means, negative or positive, indicates the magnitude of the difference between equivalent scales for the full group. In the present case, positive values represent underestimations whereas negative values point to overestimations of problems compared to others' ratings.

7.4.4. Discussion

The aim of the present studies was to investigate whether young children aged 8 to 10 years are able to make differential judgments of their self-regulatory skills. For this purpose, a new self-rating scale of self-regulation (SelfReg) was developed in which children have to relate their own behaviour to that of other children (study 1). The items were presented as two opposites in story-like scenarios. According to the analysis of the SelfReg-preform based on the construction sample data, two subscales addressing monitoring and organizing/planning skills had to be excluded from the scale because of insufficient reliability. Several possible reasons may account for this. First, it may be particularly difficult for children of this age to be aware of these types of skills, and this may be especially true for monitoring which emerges rather late in the development of executive functions. In addition, demands put on self-organization and planning may vary between the age of 8 to 10 and also from one family to the next. Items in these subscales referred to home situations as well as to behaviour at school. For children of this age these items may appear unconnected. Finally, in a

sample of unselected school children, where problems are less pronounced than in a clinical sample, self-reports of skills (such as monitoring one's progress) that are difficult to perceive may be less systematic and more variable than in a clinical sample and therefore may lead to unsatisfactory reliability of scales.

For the validation of the scale with a second sample of unselected school children, seven subscales remained in the SelfReg. Three subscales belonged to the cognitive domain and four to the behavioural domain of self-regulation. In contrast to our hypotheses, the data did not support a two-factorial scale structure but suggested a more parsimonious one-factor solution. Given the close interrelatedness of executive subcomponents, it may be difficult for children to draw a clear distinction between emotional and cognitive regulation, especially at the ages of 8 to 10, as metacognitive skills undergo important changes between childhood and adolescence (e.g. Anderson, 1998, 2008; Flavell et al. 1999). Different factorial structures across development have been reported for other self-rating scales for children, for example, for an awareness questionnaire of neuropsychological deficit for children (SAND-C, Hufford & Fastenau, 2005).

In study 2 we investigated whether children with dysfunctional self-regulation (DSR) differed in their ratings of self-regulative skills from normal controls. As hypothesized, children with DSR rated themselves as significantly more impaired than CTR across all SelfReg-subscales. Our results thus point to accurate self-perception in young children with behavioural and/or academic problems. This is supported by several studies claiming that young school children are responsive to negative feedback provided by their environment and that negative self-perceptions in children develop early (Chapman, 1998; Bear et al. 2002; Zeleke, 2004; Treuting & Hinshaw, 2001; Ialongo et al.1994). In line with these results and as predicted by our hypotheses, discrepancy scores calculated by subtracting a criterion (parent report and teacher report) from the child's report of self-regulatory skills did not differ between DSR children and CTR children. In contrast to other studies which used self-report and parent- or teacher-versions of the same questionnaire (Hoza et al. 2002; Hoza et al. 2004; Owens & Hoza, 2003; Owens et al. 2007), SelfReg subcales and external criteria (parent report and teacher report) used here were only roughly matched, which might present a certain

limitation. However, our results did not provide evidence for diminished accuracy of self-perception in children with DSR, relative to an external criterion, compared to normal controls.

Although the majority of children with difficulties in the present sample seemed to rate their difficulties appropriately on the SelfReg, we believe that the scale could also be a useful instrument in the detection of specific clinical subgroups presenting a reduced awareness of self-regulatory problems. The sample of children with DSR from the present study was etiologically diverse and not representative of a defined clinical subgroup. It is possible that more circumscribed clinical groups, such as children with ADHD or Oppositional Defiant Disorder, might show characteristic overestimation of competence and misperception of deficits on the SelfReg compared to other children with DSR. This has been described already in the literature (e.g. Evangelista et al. 2008; Owens et al. 2007; Hoza et al. 2002). Therefore, in a next step, the SelfReg will be validated on a group of children with ADHD.

One limitation of the study is probably the age range of the children of the validation sample and in the DSR group, which was closer to the age of 10 than to eight. We would argue, however, that the SelfReg should also be used with even younger children. The lower age limit of eight years in the present study was also chosen to ensure that all children within the full age-range had already attended school, as the age for school entrance is seven years in the Swiss school system. Currently we are testing the SelfReg on an international sample of school beginners aged six to seven years. Finally, the sample size of the children with DSR was relatively small. Further studies should use larger sample sizes.

7.4.5. Conclusions

Children as young as eight to 10 years old are able to make accurate judgments on their self-regulatory skills when they compare their own behaviour to that of others instead of relating their behaviour to abstract verbal statements. The SelfReg has been shown to be a valid and sensitive instrument for the assessment of metacognitive knowledge of self-regulative skills in school

children. It can be applied in an educational or a clinical context. It is anticipated that future research will demonstrate its usefulness in the detection of metacognitive deficits in clinical subgroups of children.

7.4.6. References

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8. Self-Perceptions of Self-Regulatory Skills in Children with Attention-Deficit/Hyperactivity Disorder aged 8-10 Years[2]

8.1. Abstract

Several studies have reported a characteristic "positive illusory bias (PIB)" in the self-evaluation of children with ADHD. However, results are controversial. The aim of the present study was to investigate whether children with ADHD aged 8 to 10 years can rate their self-regulatory skills accurately when assessed with an age appropriate instrument. Twenty-seven children with ADHD and 27 matched normal control children completed the Self-rating Scale of Self-regulatory Function (SelfReg), a new rating scale that has been specifically designed for this age group. As expected, children with ADHD rated themselves significantly more dysfunctional than control children. In most domains self ratings of children with ADHD did not diverge from parent and teacher ratings to a greater extent than self-ratings of control children, although overall results indicated a moderate tendency towards a positive bias. When a cluster analysis based on discrepancies between children's and adults' evaluations was carried out, three groups with different self-rating patterns emerged: A "positive bias" group containing exclusively children with ADHD, a "negative bias" group containing both children with ADHD and control children, and the largest group of accurate self-raters which also included children from both diagnostic groups. It is concluded that overly positive self-judgments are not an ubiquitous finding in ADHD, but may be confined to a specific subgroup of children whose specific characteristics remain to be determined.

Keywords: Attention Deficit - Hyperactivity Disorder, ADHD, self-perception, self-regulation, positive illusory bias, self-report, metacognition

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8.2. Introduction

Children with ADHD have consistently been found to demonstrate a large variety of difficulties in everyday life, such as academic underachievement (LeFever et al. 2002; Loe & Feldman 2007), social deficits (McQuade and Hoza 2008; Bagwell et al. 2001; Hodgens et al. 2000) and behavioral problems (e.g. Barkley 1997; Steinhausen et al. 2003). Some researchers suggest that despite these chronic functional problems in different areas, many children with ADHD tend to under-report the presence of these problems (Hoza et al. 2004; 2002; Evangelista et al. 2008). Conversely, some studies indicate that children with ADHD perceive their difficulties quite accurately (e.g. Barber et al. 2005; Bell et al. 2010; Klimkeit et al. 2006; Ialongo et al. 1994). Thus, the nature of self-perceptions and self-concept in children with ADHD remains a topic of controversy.

Accurate self-perceptions of competence have been described as essential aspects of mental health (Colvin et al. 1995). A limited degree of positive illusion or bias in self-perceptions may be both normative (Harter 1999; Alicke & Govorun 2005) and adaptive (Mazur et al. 1999; Taylor et al. 2000). Preschool children generally tend to overestimate their performance (Bjorklund 1997), but normal adults still continue to focus on positive achievement rather than on previous failure (Mezulis et al. 2004). However, findings from several studies suggest that pronounced positive biases are associated with problems in emotional and behavioral adaptation such as aggression and violence (Baumeister et al. 2000; Colvin et al. 1995; Costello & Dunnaway 2003; DuBois et al. 1998; Hughes et al. 1997) as well as low achievement (Hoza et al. 2004). A reduced awareness of self-regulatory skills in particular, has been linked to learning difficulties (Borkowski & Thorpe 1994). Furthermore, there is suggestive evidence that awareness of one's own deficits may serve a motivating function in behavioral treatment (Hoza & Pelham 1995), whereas inaccurate estimations of self-competence may interfere with treatment progress. Thus, a better understanding of the self-perception of children with ADHD may have implications for future treatment issues.

Studies of self-perceptions in children with ADHD have yielded mixed results. Some studies indicate that self-ratings of children with ADHD are overly positive (Vaughn, 2007; Ljusberg & Brodin 2007;

Dyson, 2003; Gresham et al. 2000; Stone & May 2002; Heath & Glen 2005; Hoza al. 2002; Hoza et al. 2004; Owens & Hoza 2003; Diener & Milich 1997; Hoza et al. 2010, Mikami et al., 2010; see Owens et al. 2007 for a review) due to self-protection as a reaction to repetitive negative feedback (Diener & Milich 1997; Hoza et al. 2002) or because of neuropsychological dysfunction and cognitive immaturity (see Poissant, 2005). In contrast, other studies found that children with ADHD are able to perceive their difficulties quite accurately (Barber et al. 2005; Treuting & Hinshaw 2001; Klimkeit et al. 2006; see Owens et al. 2007).

Hoza et al. (2002; 2007) proposed that these contradictory findings may be partly due to a methodological limitation. In these studies, results are often based on the analysis of discrepancy scores, calculated by subtracting a criterion (e.g. parent report) from the child's report of self-competence, with large differences indicating overestimations by the child (see Gresham et al. 1998; Hoza et al. 2002; Hoza et al. 2004; Owens & Hoza 2003; Diener & Milich 1997). However, ADHD children's self-perceptions are not significantly more positive than those of comparison children but are simply more discrepant from their poorer actual performance. Furthermore, larger discrepancies may simply be related to increased symptom severity (Owens & Hoza, 2003; Hoza et al. 2002, De Los Reynas & Kazdin, 2004).

Several theoretical explanations have been put forward to explain the tendency of ADHD patients to overestimate their competence (for a review see Owens et al. 2007). To date, the self-protective hypothesis has garnered more empirical support than any other explanation for the "positive illusory bias (PIB)" in children with ADHD. Nonetheless, because inconsistencies and methodological limitations remain, additional investigation and extension to other domains of competence is warranted (Owens et al. 2007). Another line of recent research has linked deficits in accuracy of self-perceptions in ADHD to impairments in metacognitive abilities (Poissant, 2005; Cornoldi et al. 1999). Metacognition refers to the self-knowledge about cognitive processes, self-assessment of ongoing processes (monitoring), and self-regulation that is based on such assessments (Nelson & Narens, 1990). In a study by Poissant (2005), children with ADHD differed significantly from control children in their metacognitive knowledge. The author posited that differences in

metacognitive knowledge between children with ADHD and controls are a question of delayed development, rather than one of the disorder itself. Social psychology research (Krueger & Dunning 1999; 2002) has proposed that deficits in judging relative performance come from poor performers' tendency to overestimate their abilities, which in turn, is due to their poorer metacognitive skills. Finally, several studies have shown that children with ADHD are less aware of errors. Typically, in neuropsychological tasks they do not slow down response speed after commission errors, in contrast to normal control children (Schachar et al. 2004; O'Connel et al. 2009). This finding has been linked to abnormal fronto-striatal network function, especially to dysfunction of the anterior cingulate cortex (Liotti et al. 2005; Albrecht et al. 2008).

The majority of studies claiming a positive bias in the self-estimation of ADHD children have been based on scales assessing general self-concept in academic, social, physical or other domains (e.g. Piers-Harris Children's Self-Concept Scale, Pierce & Herzberg, 2002). Specific self-report scales for children with ADHD based on DSM - IV - criteria, which ask for ADHD-related problems and typical situations, have been shown to correlate with parents' ratings (e.g. Görtz et al. 2002) and, thus, provide evidence that children and adolescents with ADHD are at least partly aware of their problems. However, these scales are likely to be less appropriate when it comes to the investigation of biased self-perception, because they are specific to ADHD and may produce floor effects in non-affected children. Most ADHD self-report scales are designed for older children and adolescents, i.e. from the age of 11 years on, probably due to the fact that questionnaires relating to abstract verbal concept are too difficult to be understood by younger children. This latter point is also true for the majority of scales relating to self-regulatory function.

Deficient self-regulation has been considered a core feature of ADHD (Barkley 1997, 2006), but is also present in many other psychopathologies such as learning disorders, conduct disorders, autism, and neurological conditions. According to current definitions, self-regulatory skills enclose a cognitive as well as an emotional/motivational dimension (see Blair & Diamond, 2008; see the monograph by Baumeister & Vohs, 2004). The concept shows considerable overlap with the neuropsychological construct of executive functions, especially with models that comprise "hot" (i.e.

emotional/motivational) as well as "cold" (i.e. cognitive) executive functions (Hongwanishkul et al. 2005; Kerr & Zelazo 2004). A number of different self-report inventories of self-regulatory skills have been developed for older children and adolescents, some focusing more on metacognitive skills (e.g. Dennison et al. 1996; Meltzer et al. 2004), and others more on executive functions (e.g. Guy et al. 2005).

To fill in the gap for younger school children, we developed a new self-report scale of self-regulatory skills, the Self-rating of Self-Regulatory Function (SelfReg) (Rizzo et al. 2010; Rizzo et al. 2006). The development of the scale was based on the assumption that children younger than 10 years old are able to make accurate judgments on self-regulatory functions, as long as items are presented in an age-appropriate form. Although metacognitive skills in the strict sense seem to emerge at the age of 8 to 10 (Veenman et al. 2006; Lockl & Schneider, 2006), young schoolchildren with academic or behavioral problems leading to negative feedback may have a clear notion of being different and less apt than their peers (Bell et al. 2010, Chapman, 1998; Bear et al. 2002; Zeleke, 2004; Treuting & Hinshaw 2001; Ialongo et al. 1994; Klimkeit et al. 2006). On the SelfReg, instead of relating to abstract verbal statements, children compare their own behavior to that of others in concrete daily-life scenarios (for a detailed description see methods section). A previous study showed that clinically referred children with various types of academic, behavioral and developmental difficulties rated themselves accurately as more impaired on the SelfReg compared to age matched controls (Rizzo et al. 2010).

The aim of the present study was to investigate whether children with ADHD as young as 8 to 10 years are able to rate their self-regulatory skills accurately when assessed with an age-appropriate instrument. First, and in contrast to studies that found no difference between absolute self-ratings in children with and without ADHD (see Owens et al. 2007), we expected children with ADHD to rate themselves accurately as more impaired than control children on the SelfReg. In a second step, we investigated whether self-estimation of children with ADHD diverges more from parents and teacher's judgments than self-estimation of controls. Here, we hypothesized in accordance with the PIB hypothesis that discrepancies between children's self-ratings and teacher's/parents' ratings would be more pronounced in children with ADHD than in control children. Finally, in an exploratory

analysis, we investigated whether characteristic over-estimation is confined to specific subgroups. As pointed out by recent research findings, there is considerable heterogeneity of neuropsychological impairment in ADHD (e.g. Sonuga Barke et al. 2005; Willcutt et al. 2005) with the majority of ADHD children showing no or only minor deficits. Likewise, PIB might either be a general phenomenon in ADHD or, rather, constrained to a small subgroup of children.

8.3. Method

8.3.1. Participants

Participants consisted of twenty-seven children with ADHD and twenty-seven normal control children (CTL) aged 8 to 10 years matched for age, gender and IQ (Table 1). Both groups included 21 boys and 6 girls.

Table 1. *Descriptive data of children with ADHD (N=27) and controls (CTL) (N=27)*

	ADHD (N=27) Mean (SD)	**CTL (N=27)** Mean (SD)	***p***
Age	9.9 (0.8)	9.8 (0.6)	*n.s.*
Boys / Girls	21 / 6	21 / 6	*n.s.*
Estimated IQ	103.3 (15.7)	108.8 (18.8)	*n.s.*
PARENTS' RATINGS			
BRIEF parents' (T-scores)			
Behavioral Regulation	62.1 (12.8)	46.3 (8.1)	***
Metacognition	64.1 (10.5)	48.6 (10.3)	***
CBCL (T-scores)	58.8 (11.5)	49.6 (9.4)	**
Internalizing problems			
Externalizing problems	63.6 (9.8)	50.0 (8.7)	***
Aggressiveness	63.1 (8.6)	54.0 (4.1)	***
Anxious depressed	59.4 (10.6)	53.5 (5.9)	*
SNAP (raw scores)			
Attention	16.7 (4.6)	6.3 (4.5)	***
Hyperactivity	5.9 (3.3)	1.4 (2.0)	***
Impulsivity	5.5 (3.2)	1.8 (1.7)	***
ODD	9.44 (3.5)	4.7 (3.3)	***

SDQ (raw scores)			
Conduct problems	3.5 (2.0)	1.2 (1.1)	***
Emotional problems	3.8 (2.7)	1.6 (1.7)	**
Peer problems	2.9 (2.2.)	1.2 (1.5)	**
Supplementary questions (raw scores)			
Sluggish tempo	9.7 (3.2)	7.4 (2.3)	**
Motivation	9.6 (2.8)	6.2 (2.1)	***
TEACHER RATINGS			
CTRS-R (T-scores)			
Conners DSM-IV hyperactive-impulsive	63.2 (11.9)	48.6 (7.0)	***
Conners DSM-IV inattentive	64.1 (9.2)	49.4 (6.2)	***
BRIEF TEACHER (T-scores)	66.3 (13.6)	51.2 (10.0)	***
Behavioral Regulation			
Metacognition	68.1 (11.7)	53.8. (10.2)	***
Supplementary questions (raw scores)			
Sluggish tempo	9.6 (3.0)	7.5 (2.8)	*
Motivation	9.1 (2.9)	5.7 (2.0)	***

Note. T-tests, SD=standard deviation, *n.s.*=not significant, *** $p<0.001$, ** $p<0.01$

Children with ADHD were recruited via the Department of Child and Adolescent Psychiatry, University of Zurich. CTL were recruited via public schools in the surrounding regions of Zurich. Intelligence (IQ) was measured individually by a short form of the German version of the revised Wechsler Intelligence Scale for children (HAWIK III), which includes the subtests Block Design, Picture Arrangement, Arithmetic, and Vocabulary (Schallberger, 2005).

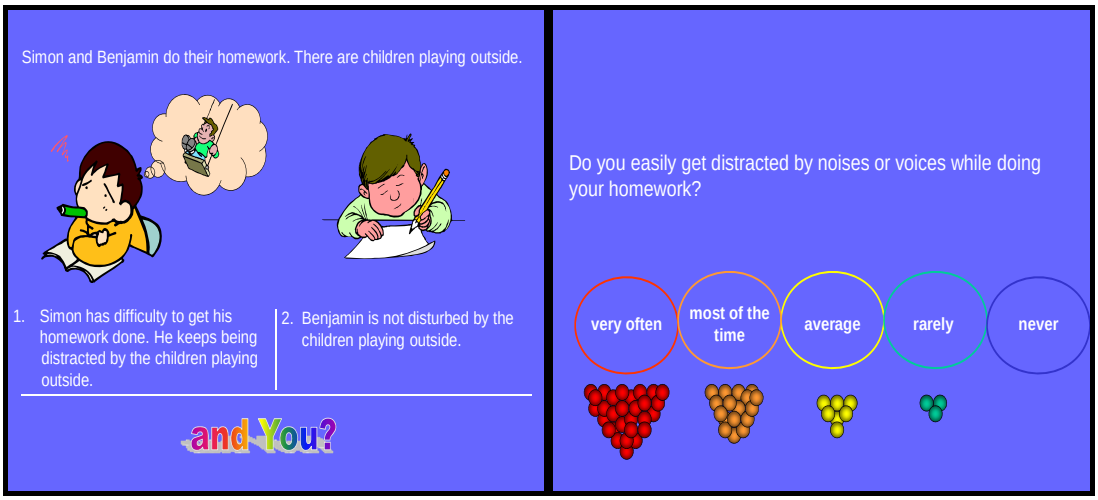
ADHD diagnosis was based on HYPESCHEME, a computerized operational criteria checklist and diagnostic algorithm for DSM-IV and ICD-10 from the international genetic study IMAGE (Curran et al. 2000; see Christiansen et al. 2008), which includes a diagnostic interview (Parental Account and Symptom Ratings PACS, Taylor et al. 1986) and the Conners Teacher Rating Scale Revised CTRS-R (Conners. 1997). Based on HYPESCHEME, 14 children were classified as ADHD combined subtype and 13 as inattentive subtype. Children referred to the clinic for severe behavioral problems (Oppositional Defiant Disorder/Conduct Disorder) were not included in the study. Twenty-three children had received a formal diagnosis of ADHD by an independent clinician prior to entering the study. At the time of assessment, thirteen of the 27 children with ADHD were taking stimulant medication.

Control children who scored above the clinical cut-off on the SNAP (Swanson et al. 1998) or CTRS-R were excluded from the study. Written consent was obtained from the parents of all children. The study was approved by the Ethical Committee of the Department of Psychiatry, University of Zurich.

8.3.2. Instruments

Children. Children reported self-perceptions on the SelfReg (Rizzo et al. 2006; Rizzo et al. 2010). The SelfReg consists of 28 items belonging to 7 subscales with 4 items each: 1. Distractibility, 2. Sustained Attention, 3. Emotional Control, 4. Motor Activity, 5. Motivation, 6. Inhibition, and 7. Speed of Processing. Each item begins with the description of a typical situation, followed by two ensuing opposing types of behaviour shown by children: one example of good regulatory skills and one of poor self-regulation. The child is then asked whether he or she is likely to show the same behaviour as in one of the presented alternatives. In half of the items the child is asked to compare his or her own behaviour to the negative, in the other half to the positive alternative. The child answers on a five point Likert scale ranging from "very often" to "never". Each item is illustrated by pictures. Two versions have been created, one for boys and one for girls, with gender specific pictures and names. About half of the scenarios are situated at home and the other half at school. Examples for each subscale are listed in the appendix (for an example of a single item see Figure 1). Items and subscales were derived empirically from an original set of 112 items and validated on a sample of normal school children aged 8 to 10 years (Rizzo et al. 2010).

Fig. 1. *SelfReg item example*



Parents. The parents completed the Behavior Rating Inventory of Executive Function BRIEF (Gioia et al. 2000), the Child Behavior Checklist (CBCL, Achenbach 1991), a German short version (18 items plus 8 ODD items) of the Swanson, Nolan and Pelham Questionnaire (SNAP, Swanson et al. 1998), the Strength and Difficulty Questionnaire (SDQ, Goodman et al. 1998), as well as a short checklist with supplementary questions on the child's regulation of motivation and speed of processing. Responses to this checklist were rated on a five point Likert scale ranging from "very often" to "never". This checklist had been created by the authors in order to collect parental ratings that matched the equivalent subscales of the SelfReg (see appendix).

Teacher. In addition to the Conners Teacher Rating Scale Revised (CTRS-R, Conners 1997), teachers filled in the teacher version of the BRIEF (Gioia et al. 2000). They also completed a checklist with supplementary questions on the child's motivation and speed of processing/sluggish tempo (see appendix).

8.3.3. Procedure

The SelfReg and the IQ-tests were administered to the children at the Department of Child and Adolescent Psychiatry, or in a separate room at the child's school. The administration of the SelfReg

took approximately 15 to 20 minutes. To ensure comprehension, research assistants administered measures individually and read aloud all items of the SelfReg to child participants. Parents generally completed written measures on their own, either at the clinic or at home.

8.3.4. Data Analysis

In a first step, items with negative content of the SelfReg were re-coded so that high subscale scores indicate dysfunctional self-regulatory skills. Because distributional assumptions of equality of covariance and error variance for MANOVA were not met, even after application of the standard transformation procedures (see Kirk ,1995), SelfReg subscale scores of children with ADHD and controls were compared separately by t-tests. A Bonferroni correction was performed and the significance level was set to alpha =.007. Effect sizes (Cohen's d) were calculated for all subscales and the total score of the SelfReg.

The accuracy of self-perceptions was examined by comparing the self-perceptions of children with ADHD and CTL children relative to parents' and teacher's perceptions. To this aim, separately for each domain discrepancy scores were calculated by subtracting aggregated scores from parents' and teacher's ratings from the children's subscale scores. All scores were previously z-transformed. Aggregated scores from both parents and teacher ratings were chosen because SelfReg items depict situations at home as well as in class. For the aggregation of parents and teacher judgements, subscale scores were first z-transformed and then added to each other. As the SelfReg does not match directly any existing rating scale for parents or teacher, subscale scores had to be selected from different instruments and subtracted from z-transformed SelfReg subscales as follows: 1. SNAP (parents) inattention score and CTRS-R DSM-IV inattention score were aggregated and subtracted from a combined SelfReg Distractibility and SelfReg Sustained Attention score. It was necessary to combine these two SelfReg subscales into one, because the items on sustained attention and distractibility belong to the same subscale in the parent and teacher scales. 2. The aggregated BRIEF emotional control subscale (parents' and teacher's version) score was subtracted from the SelfReg Emotional control score. 3. The aggregated SNAP (parents) hyperactivity subscale score plus the

CTRS-R Hyperactivity subscale score were subtracted from the SelfReg Motor Activity score. 4. The aggregated supplementary parent's and teacher's questions score on motivation were subtracted from the SelfReg Motivation score. 5. The aggregated BRIEF inhibition subscales (parent's and teacher's version) scores were subtracted from the SelfReg Inhibition score. 6. The aggregated supplementary parent's and teacher's questions scores on speed of processing/sluggish tempo were subtracted from the SelfReg Speed of processing score. Discrepancy scores were compared by Mann Whitney U tests (because of unequal variances), and effect sizes according to Cohen's d were calculated. Overall discrepancies (Diff total score) were calculated for both groups and compared by Mann Whitney U test. Additionally, an exploratory cluster analysis based on six discrepancy scores was carried out for the whole sample (N=54) with the aim of detecting subgroups of children who under- or over-estimated their skills (Ward Method, 2 to 4 cluster preselected). Differences between cluster members with regard to discrepancy scores and clinical scores were compared by nonparametric methods (Kruskal-Wallis H, Mann-Whitney U). All statistical computations were performed by use of the Statistical Package for the Social Sciences (SPSS 14).

8.4. Results

8.4.1. Analyses of group differences on SelfReg and discrepancies

As shown in Table 2, children with ADHD rated themselves as more impaired than control children on 5 out of 7 subscales with effect sizes ranging from .68 to .84. After Bonferroni correction, significant group differences remained for the subscales measuring Distractibility, Emotional Control, Motor Activity and Inhibition.

Table 2. *SelfReg subscale scores (raw scores) of children with ADHD (N=27) and controls (CTL) (N=27)*

Subscale	ADHD (N=27)		CTL (N=27)			Effect size (d)
	Mean	(SD)	Mean	(SD)	*p*	
Distractibility	12.8	(4.6)	9.7	(2.4)	.004*	.84
Sustained Attention	11.3	(4.8)	8.8	(2.0)	.019	.68
Emotional Control	11.5	(4.1)	8.6	(2.9)	.004*	.82
Motor Activity	11.9	(4.6)	9.1	(2.3)	.006*	.77
Inhibition	10.9	(5.1)	7.7	(2.7)	.006*	.78
Motivation	10.8	(5.0)	9.8	(4.1)	.432	.22
Speed of Processing	11.4	(3.7)	10.8	(3.4)	.494	.17
SelfReg Total score	81.0	(27.0)	61.9	12.2	.002	.91

Note. SD = standard deviation, *= significant after Bonferroni correction

Results of discrepancy analyses are shown in Table 3. Except for the discrepancy between SelfReg subscales Distractibility/Sustained Attention and aggregated inattention scores (p=.048), no significant group differences emerged. Discrepancies for Inhibition and Motor Activity were significant by trend only with moderate effect sizes. After correction for multiple testing group difference between discrepancy scores were not significant anymore. Overall discrepancies (Diff total score) did not discriminate between groups. However, effect size (Cohen's d) of discrepancies total score reached 0.51 which is considered an effect of moderate size. These findings indicate that in relation to parent's or teacher's ratings, self-ratings on the SelfReg by children with ADHD on different subscales are mostly as accurate as those by CTL children, although overall results indicate a tendency toward a positive bias.

Table 3. *Mean discrepancies (z-values) between SelfReg subscales and aggregated scores from parent's and teacher's ratings in children with ADHD and control children (CTL)*

Differences between SelfReg ratings minus aggregated parents' and teacher's ratings (z-scores)	ADHD (N=27)	CTL (N=27)		Effect size
	Mean (SD)	Mean (SD)	*p*	(d)
DIFF Distractibility/Sustained attention[1]	-. 352 (1.62)	.352 (.76)	.040	.55
DIFF Emotional Control [2]	-.104 (1.46)	.104 (.96)	.910	.16
DIFF Motor Activity [3]	-.311 (1.61)	.311 (.68)	.154	.50
DIFF Motivation [4]	-.054 (.44)	.054 (.39)	.406	.26
DIFF Inhibition [5]	-.314 (1.53)	.314 (.88)	.088	.50
DIFF Speed of Processing [6]	-.034 (.62)	.034 (.45)	.653	.12
DIFF Total Score	-1.101 (5.37)	1.101(2.83)	.126	.51

Note. SelfReg subscales minus aggregated ratings from: 1.SNAP (parents) inattention subscale plus CTRS-R DSM IV inattentive subscale, 2. BRIEF emotional control subscales (parent's and teacher's version), 3. SNAP (parents) hyperactivity subscale plus CTRS-R hyperactivity subscale, 4. supplementary parents' and teacher's questions on motivation (appendix), 5. BRIEF inhibition subscales (parent's and teacher's version), 6. supplementary parent's and teacher's questions on speed of processing/sluggish tempo (appendix); ES= effect size, Cohen's d

8.4.2. Cluster analysis

A three cluster-solution provided the most convincing result. Mean discrepancy scores and SelfReg subscale means of cluster members are displayed in Table 4. Cluster 1 comprises 16 children, 8 children with ADHD and 8 CTL. Cluster1 children rated themselves as more severely impaired on self –regulatory functions compared to parents' and teacher's estimation. This cluster may be labeled "negative bias" or "under-estimators". Cluster 2 comprises 30 children, 11 with ADHD and 19 CTL children. This largest group represents children with accurate self-perception compared to parent's and teacher's judgment so that this cluster contains the "accurate estimators". Cluster 3 consists of 8 children with ADHD and no CTL. These children had systematically overestimated self-regulatory skills compared to parent's and teacher's ratings. Thus, this cluster may be called "positive bias" or "over-estimators". Children from cluster 1, 2 and 3 significantly differed with regard to discrepancies between self- and parents/teacher judgments on all scales except for Motivation and Speed of Processing as may be seen from Table 4. Members of Cluster 1, 2 and 3 also showed significant differences on four out of seven SelfReg subscales (Table 4). "Under-estimators" differed from "over-estimators" on all subscales, except for Speed of Processing. When children from the "positive bias" Cluster 3 were directly compared to all remaining children from Cluster 1 and 2

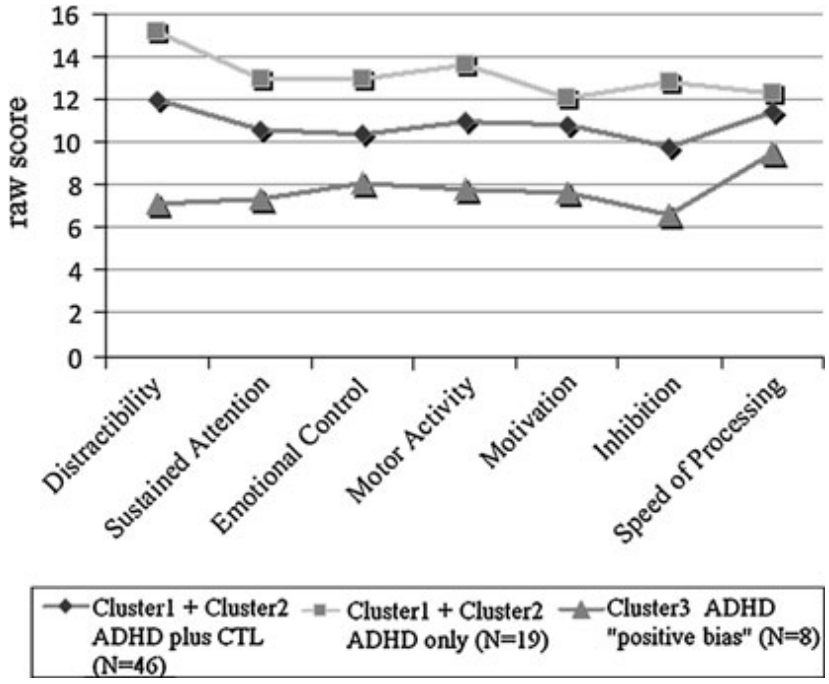
("negative bias" plus "accurate", N=46), group differences of SelfReg total score (p=.012) and subscales Distractibility (p=.001) and Sustained Attention (p=.036) became significant, indicating that children from cluster 3 had effectively chosen more overtly positive self-ratings compared to all other children (Figure 2).

Table 4. *Mean discrepancies scores (z-values) and mean Selfreg subscale scores in three clusters of children*

	Cluster 1 "negative bias" (N=16) Mean (SD)	**Cluster 2 "accurate estimation"** (N=30) Mean (SD)	**Cluster 3 "positive bias"** (N=8) Mean (SD)	***p*** [a]	***p*** [b]
Differences between SelfReg ratings minus aggregated parents' and teacher's ratings					
DIFF Distractibility/Sustained Attention [1]	1.382 (.67)	-.172 (.54)	-2.117 (1.02)	.000	C1, C2>C3
DIFF Emotional Control [2]	1.134 (.55)	-.185 (.91)	-1.572 (1.24)	.000	C1, C2>C3
DIFF Motor Activity [3]	1.089 (.69)	-.113 (.68)	-1.756 (1.70)	.000	C1, C2>C3
DIFF Motivation [4]	.042 (.40)	-.030 (.40)	.028 (.54)	.791	
DIFF Inhibition [5]	1.305 (.75)	-.216 (.78)	-1.797 (.91)	.000	C1, C2>C3
DIFF Speed of Processing [6]	.068 (.61)	-.106 (.51)	.262 (.44)	.149	
SelfReg (mean raw scores, SD)					
Distractibility	14.0 (3.4)	11.0 (3.6)	7.1 (2.7)	.000	C1, C2>C3
Sustained Attention	12.9 (4.2)	9.3 (2.9)	7.4 (3.6)	.003	C1>C3
Emotional Control	13.2 (3.5)	8.9 (3.2)	8.1 (3.2)	.001	C1>C3
Motor Activity	13.5 (4.2)	9.8 (3.0)	7.9 (3.6)	.010	C1>C3
Inhibition	13.2 (5.1)	8.0 (3.1)	6.6 (1.4)	.002	C1>C3
Motivation	12.2 (4.8)	10.0 (4.5)	7.6 (3.5)	.100	C1>C3
Speed of Processing	12.6 (3.6)	10.8 (3.3)	9.5 (3.5)	.088	
SelfReg Total Score	91.1 (24.8)	65.5 (16.5)	54.2 (11.4)	.000	C1>C3

Note. SelfReg subscales minus aggregated ratings from: [1] SNAP (parents) inattention subscale plus CTRS-R DSM IV inattentive subscale; [2] BRIEF emotional control subscales (parents' and teacher's version) [3] SNAP (parents) hyperactivity subscale plus CTRS-R Hyperactivity subscale; [4] supplemen-tary parents' and teacher's questions on motivation (appendix), [5] BRIEF inhibition subscales (parents' and teacher's version); [6] supplementary parents' and teacher's questions on sluggish tempo (appendix); [a] 3 groups comparison, Kruskal-Wallis; [b] 2 groups comparison, Mann Whitney U; C1= Cluster1, C2=Cluster2, C3=Cluster3

Fig. 2. *SelfReg subscales mean scores of children with ADHD presenting a positive bias (N = 8) compared to children from Cluster 1 and Cluster 2 (ADHD plus CTL and ADHD only)*



To detect specific characteristic of children within the ADHD group presenting a positive bias in their self-evaluation, children from Cluster 3 were compared with diagnosed ADHD children from Cluster 1 and Cluster 2. In a first, the two subgroups were considered separately (Cluster 1: N= 8, Cluster 2: N=11), and in a second step the two subgroups were combined (N=19). Findings are shown in Table 5. When comparing the three clusters, group differences were found on parents SDQ ratings of Emotional Problems and teacher ratings of the CTRS-R DSM-IV Inattentive and Hyperactive-impulsive subscales. Only the latter two proved to be significant on direct subgroup comparison. When Cluster 3 children were compared to the remaining combined ADHD children subgroup, a significant effect for age and a trend for IQ emerged. Children from the "positive bias" Cluster 1 were rated as more impaired by parents on the Metacognition Index of the BRIEF and by teachers on the CTRS-R DSM-IV inattentive and hyperactive-impulsive subscales.

Table 5. *Characteristics of cluster members (total sample N= 54 and ADHD N=27) and symptom severity (mean, SD) of children with ADHD (N=27) from Cluster 1, Cluster 2 and Cluster 3*

Characteristic/ Scale	Cluster 1 "negative bias"	Cluster 2 "accurate estimation "	Cluster 3 "positive bias"	p^a	p^b	p^c
All (N=54)	N=16	N= 30	N=8			
Age (mean, SD)	9.9 (.66)	10.0 (.75)	9.4 (.91)	ns		
Boys/girls (N)	12/4	25/5	5/3	ns		
Estimated IQ (mean, SD)	107.9 (18.8)	108.1 (17.5)	94.7 (10.0)	ns		
ADHD (N=27)	N=8	N=11	N=8			
combined/ inattentive (N)	3/5	6/5	5/3			
Age mean (SD)	10.0 (.79)	10.3 (.80	9.4 (.91)	ns		C3<C12*
Boys/girls (N)	6/2	10/1	5/3			
Estimated IQ (mean, SD)	105.4 (13.7)	106.6 (18.3)	94.7 (10.0)	ns		C3<C12+
BRIEF parent	60.8 (10.9)	57.4 (13.7)	69.9 (10.6)			
Behavioral Regulation	61.7 (11.4)	63.5 (10.3)	67.2 (10.7)	ns		C3>C12*
Metacognition				ns		Ns
SDQ						
Peer problems	2.2 (1.8)	2.8 (2.2)	3.6 (2.6)	ns		ns
Emotional problems	5.1 (2.6)	2.4 (2.5)	4.5 (2.7)	*	ns	ns
Conduct problems	3.7 (1.3)	3.3 (2.4)	3.6 (2.2)	ns		ns
SNAP						
Inattention	15.0 (1.8)	16.4 (6.3)	18.8 (3.4)	ns		ns
Hyperactivity	5.4 (2.5)	6.1 (2.5)	6.2 (5.1)	ns		ns
Impulsivity	6.1 (3.6)	4.7 (2.3)	6.2 (4.0)	ns		ns
ODD	10.2 (2.5)	9.0 (3.7)	9.2 (4.5)	ns		ns
CBCL						
Aggressiveness	61.8 (6.6)	61.6 (9.1)	66.5 (9.6)	ns		ns
Anxious/depressed	60.6 (10.9)	56.1 (10.7)	62.6 (10.2)	+	ns	ns
CTRS-R						
DSM IV inattentive	57.1 (7.3)	64.9 (4.5)	70.2 (11.6)	*	C1<C3*	C3>C12*
DSM IV hyperactive-impulsive	57.7 (10.6)	59.9 (7.8)	73.5 (12.5)	*	C1<C3* C2<C3*	C3>C12*
BRIEF teacher						
Behavioral Regulation	62.6 (7.3)	64.9 (9.6)	72.0 (20.9)	ns		ns
Metacognition	66.0 (9.4)	69.9 (6.2)	67.7 (18.8)	ns		ns

Note. C1=Cluster 1, C2=Cluster 2, C3=Cluster 3; C12 = Cluster 1 plus Cluster 2 (N=19); CTL= Controls; [a] 3 cluster comparison (Kruskal Wallis); [b] Cluster 3 compared to Cluster 2 and Cluster 3 separately (Mann Whitney U); [c] C3 compared to C12 (Mann Whitney U); ns=non significant; *= p<.05; + =.05< p < .06

8.5. Discussion

In this study, the accuracy of self-perceptions of self-regulatory skills in children with ADHD aged 8 to 10 years was compared to aged matched control children. Children rated their skills on a new rating scale, the SelfReg and their scores were subsequently related to parents' and teachers' ratings on different clinical scales. Consistent with the initial hypothesis, children with ADHD rated themselves as more impaired than control children on a majority of subscales. This is in accordance with several studies reporting that young school children with various types of behavioral or developmental difficulties are quite well aware of their problems (Bell et al. 2010, Chapman, 1998; Bear et al. 2002;

Zeleke. 2004; Treuting & Hinshaw 2001; Ialongo et al. 1994; Klimkeit et al. 2006). Consequently, we did not find clear evidence that children with ADHD consistently overestimate their skills compared to age matched peers, as claimed by the illusory positive bias theory. Although there might be a general tendency towards a positive bias, as indicated by the moderate effect size for discrepancies total score, this effect seems to be smaller here compared to the literature (i.e. ES = 1.48 for discrepancy scores on behavioral ratings, Hoza et al. 2002).

Several explanations may account for this finding. On the SelfReg, children are not asked to rate the quality of performance or the severity of deficits directly but, rather, have to compare their own behavior to that of others. The description of other children's behavior in concrete and familiar situations provides a frame of reference which, for some children, makes it easier to refer to daily life experiences and to evaluate their own behavior in a more realistic way. It has been argued that the PIB effect is not present when children with ADHD have to evaluate performances of others, showing that PIB is not simply due to cognitive impairment or inadequate skills in evaluating performance (Evangelista et al. 2008). However, in relatively young children and in children with metacognitive difficulties (see Poissant, 2005), items representing small scenes may permit an easier access to realistic self-representations than abstract verbal items. In addition, SelfReg subscales that discriminated best between children with and without ADHD were closely related to ADHD main symptoms. Although the SelfReg is conceived as a measure of self-regulatory function and not as a specific ADHD scale, there might be a considerable overlap. This has also been found for other scales on self-regulation/executive function, such as the BRIEF, which quite reliably discriminates children with ADHD from non affected controls (Sullivan & Riccio 2007; Toplak et al. 2009).

In a second step, we investigated whether the self-ratings of children with ADHD diverge more strongly from the judgments of parents and teachers than the self-ratings of control children. Even though children with ADHD may be aware of some difficulties, they could nevertheless underestimate the severity of their problems. Contrary to expectations, this was not the case. When corrected for multiple testing, discrepancies between children's and adults' ratings were not significantly larger in the ADHD group compared to controls. However, effect-sizes were medium for

three discrepancy scores, i.e. the aggregated score of the Distractibility/Sustained Attention subscales, the Inhibition subscale and the Motor Activity subscale, and for the discrepancies total score, indicating a tendency toward a positive bias after all.

Therefore, in a third step, we investigated whether it is possible to detect subgroups within the total sample that systematically under- or overestimated skills, compared to adults' ratings.

A cluster analysis based on discrepancy scores of the complete sample distinguished three different clusters of self-raters in relation to the evaluation of parents and teachers: accurate estimators (no bias), under-estimators (negative bias) and over-estimators (positive bias). The subgroup of children overestimating their self-regulatory skills relative to the other two cluster groups (accurate estimators and under-estimators) was composed exclusively of children with ADHD. Thus, one may conclude that the characteristic positive bias observed in ADHD was also found in the present sample. However, it was limited to a subgroup of children. When ratings of this "positive bias" subgroup on the SelfReg were directly compared to all other children's ratings, they generally scored lower, and, in consequence, rated themselves more positively than other children. Thus, the classification of this group into a cluster of "over-estimators" was not simply due to a methodological artifact, but represented a real difference with regard to the self-evaluation of self-regulatory skills of these children. Interestingly, the group of under-estimators, that is children who have a lower opinion of their own skills and a more negative view of their deficits compared to adults' ratings, was composed half of children with ADHD and half of control children. Thus, it is not only possible to detect a group of children with ADHD that present positively biased self-evaluations, but also a subgroup of children with ADHD whose self-estimation is systematically biased into a negative direction. As this tendency can also be observed to the same extent in normal children, it may be considered within the limits of normal variability and obviously has received no special interest in the literature so far, at least not with regard to self-ratings in the behavioral domain. Children with ADHD from the "negative bias group" scored significantly higher on the SelfReg than other groups, so that cluster-membership was not merely an artifact due to low symptom severity as rated by adults.

Finally, ADHD children from the cluster groups were compared with regard to demographic

characteristics and clinical symptoms. Children belonging to the "positive bias" group were slightly younger and tended to have lower IQ scores than the other children with ADHD. This is in accordance with "immaturity" and "metacognitive deficit" explanations of PIB (e.g. Poissant 2005), but in contrast to recent studies claiming that PIB persists in ADHD over the years (Hoza et al. 2010). Children from the "positive bias group" were also rated as more impaired by parents on the Behavioral Index of the BRIEF and by teachers on the CTRS-R DSM-IV Inattentive and Hyperactive-impulsive Indices. We did not detect group differences with regard to CBCL aggressiveness or anxious/depressed subscales, i.e. on symptom dimensions that might represent possible confounds (Kaiser et al. 2008; see Owens et al. 2007), possibly because severe ODD had been excluded.

8.6. Limitations

A limitation compared to other studies on PIB lies with the fact that we could not rely on matched self-report and informant forms in order to establish discrepancy scores between children's and adults' ratings. The necessary aggregation of two SelfReg subscales into one that matches equivalent adults' report inattention subscales may represent a further methodological weakness. In addition, in the absence of viable alternatives, we had to create supplementary items on motivation and speed of processing for parents and teachers, which have not been evaluated yet for psychometric properties. Finally, given the small subsample sizes, generalization of the present findings may be questioned. Thus, the exploratory nature of this part of the analysis has to be emphasized.

8.7. Conclusion

Children with ADHD as young as 8 to 10 years old provide accurate judgements on their self-regulatory skills when tested with an age appropriate instrument. Although we could not find a distinct positive bias in the self-perception of skills and deficits in ADHD, subsequent analysis of subgroups provided evidence for characteristic overestimation as well as for unexpected

underestimation of skills in different subgroups of children. These findings suggest that a positive bias in self-perception is not universal to ADHD, but may be restricted to a distinct subgroup of children whose special characteristics and developmental risks remain to be fully described.

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9. Selbst- und Fremdwahrnehmung von Beeinträchtigungen exekutiver Funktionen bei Erwachsenen mit ADHS[3]

9.1. Zusammenfassung

Es wurde untersucht, ob bei der Diagnostik exekutiver Störungen bei Erwachsenen mit Aufmerksamkeits-Defizit/Hyperaktivitätsstörung (ADHS) Diskrepanzen zwischen Selbst- und Fremdangaben sowie zwischen Fragebögen und Testergebnissen auftreten. Erwachsene mit ADHS und Kontrollprobanden füllten das Dysexecutive Questionnaire (DEX) und die Frankfurter Selbstkonzeptskalen (FSKN) aus und bearbeiteten exekutive Testverfahren. Es zeigte sich, dass Erwachsene mit ADHS sowohl in Selbst- als auch Fremdurteil im DEX auffälliger waren als Kontrollprobanden. Selbst- und Fremdurteile stimmten in beiden Gruppen etwa gleich gut überein. Bei Patienten und bei Kontrollen erbrachte die Selbsteinschätzung auffälligere Werte als die Fremdeinschätzung durch Angehörige. Zusammenhänge zwischen DEX- Einschätzungen und Testleistungen waren gering bis höchstens moderat. Die Ergebnisse zeigen, dass Selbstangaben von Erwachsenen mit ADHS zu exekutiven Funktionsbeeinträchtigungen als überwiegend zuverlässig angesehen werden können.

Keywords: ADHS bei Erwachsenen, Selbstwahrnehmung, Exekutive Funktionen, Selbsturteil, Selbstkonzept

[3] Rizzo, P. Drechsler, R. & Steinhausen H.-Ch. (accepted). Selbst- und Fremdwahrnehmung von Beeinträchtigungen exekutiver Funktionen bei Erwachsenen mit ADHS

9.2. Abstract

In the present study we examine whether adults with ADHD make accurate self-judgments of executive function deficits, compared to significant others' ratings and to objective test performance. Adults with ADHD and controls completed the Dysexecutive Questionnaire (DEX) as well as a standardized self-rating instrument on self-concept (Frankfurt Self-Concept Scales, FSKN) and performed executive tests. Adults with ADHD were more impaired than controls according to both self- and informant ratings. The agreement between self- and informant ratings was equally good in both groups. For both groups, self-ratings revealed higher impairment scores than ratings by significant others. The correlations between test performance and DEX-rating were low to moderate. These results indicate that self-ratings of adults with ADHD regarding executive deficits may be considered as predominantly reliable.

Keywords: Adults with ADHD, self-awareness, executive functions, self-rating, self-concept

9.3. Einleitung

ADHS ist mit einer Prävalenz von über 4 % eine häufige Störung des Erwachsenenalters (de Zwaan et al., 2011). Etwa zwei Drittel der in der Kindheit Betroffenen leiden auch als Erwachsene noch unter klinisch relevanten Symptomen; aber viele ADHS-Patienten werden erst im Erwachsenenalter diagnostiziert (Young et al., 2008, vgl. Überblick bei Schmidt & Petermann, 2011). Wie auch bei Kindern mit ADHS, sind neuropsychologische Beeinträchtigungen bei Erwachsenen mit ADHS sehr heterogen, möglicherweise noch mehr als bei Kindern zusätzlich durch häufige Komorbidität beeinflusst (vgl. Sobanski, 2006, Fischer et al., 2005; Schmidt et al., 2006, vgl. Metaanalyse von Boonstra et al., 2005). Je nach theoretischem Konzept werden mehr kognitive („cold EF“) von mehr motivationalen („hot EF“) Aspekten exekutiver Funktionen unterschieden (vgl. Castellanos et al., 2006) und es werden auch Aufmerksamkeitsleistungen (z.B. Regulation von Alertness, Aufmerksamkeitsverteilung, geteilte Aufmerksamkeit) den Exekutiven Funktionen zugerechnet (vgl. Überblick bei Drechsler, 2007). Gemäss den sogenannten „Dual path“ oder „multiple path“ Theorien von ADHS (Sonuga Barke, 2002; 2010) können diese Bereiche bei ADHS in unterschiedlichem Ausmass und Kombinationen betroffen sein. Auch bei Erwachsenen mit ADHS wurden sowohl eher kognitive Störungen exekutiver Funktionen (z.B. Beeinträchtigungen der Inhibition, beim Planen, der mentalen Flexibilität, des Arbeitsgedächtnisses), als auch motivationale Beeinträchtigungen exekutiver Funktionen (z.B. Lernen durch Belohnung, Verarbeitung von Feedback) und Störungen der Aufmerksamkeit (z. B. Daueraufmerksamkeit) beschrieben, wobei testpsychologisch nur ein Teil der ADHS-Betroffenen klinisch auffällige Werte erreicht (Barkley & Murphy, 2010; Biederman et al., 2007). Unauffällige Testresultate stehen manchmal im Widerspruch zu den Angaben der Betroffenen selbst oder deren Angehörigen. Skalenwerte in typischen ADHS-Fragebögen korrelieren meist nicht oder nur gering mit objektiven Leistungen in exekutiven Testverfahren (Biederman et al., 2008). Das trifft auf Fremdbeurteilungen von Kindern und Erwachsenen ebenso zu wie auf Selbsteinschätzungen. Zum Teil mag das damit zusammenhängen, dass die in ADHS-Skalen abgefragten Symptome sich nicht eins zu eins mit neuropsychologischen Konstrukten decken, die in Testverfahren untersucht werden. Aber auch in Studien, die spezifischere Fragebögen zu exekutiven Defiziten verwendeten (die zum Teil allerdings aus ADHS-Modellen

abgeleitet waren), konnten alltagsrelevante Beeinträchtigungen (z.B. beruflicher Misserfolg) besser aus Selbstangaben der Betroffenen als aus neuropsychologischen Tests vorhergesagt werden (Biedermann et al., 2007; Barkley & Murphy, 2010;) und Zusammenhänge zwischen Fragebogen-Skalenwerten und Testergebnissen waren höchstens moderat (Biederman et al., 2008) und insbesondere auf Unaufmerksamkeitssymptome bezogen (Stavro et al., 2007). Aber nicht nur die Validität von Testverfahren zu exekutiven Funktionen und Aufmerksamkeit, auch die Validität von Selbstaussagen wurde bei ADHS immer wieder angezweifelt. Während einige klinische und epidemiologische Studien nahe legen, dass Erwachsene mit ADHS die besten Informanten in Bezug auf ihre Symptomatik sind (z.B. Kooij et al., 2008), fanden andere Studien, dass Erwachsene mit ADHS weniger Symptome berichten im Vergleich zu Fremdangaben (Smith et al., 2000; Zucker et al., 2002). Dies mag zum Teil mit der Störung selbst zusammenhängen: Selbstwahrnehmung (bzw. „Monitoring“) wird zu den exekutiven Funktionen gezählt; eine beeinträchtigte Selbstwahrnehmung kann daher Ausdruck einer exekutiven Störung sein. Dies wird typischerweise nach erworbenen Frontalhirnläsionen berichtet („Awareness“ –Störung, vgl. Prigatano, 2004), wird aber auch bei anderen klinischen Gruppen diskutiert, etwa bei Schizophrenie (vgl. z.B. Laws et al., 2008). Ein Indiz für eingeschränktes Monitoring bei ADHS liefern Studien, die von eingeschränkter Fehlerwahrnehmung bei ADHS berichten oder zumindest von verminderter Anpassung des Verhaltens, nachdem Fehler gemacht wurden (Überblick bei Shiels & Hawk, 2010). So verlangsamen ADHS-Betroffene ihre Antwortzeiten nicht nach einer Fehlreaktion oder zeigen dabei abweichende elektrophysiologische Muster (McLaughlin et al., 2009). Dies scheint vor allem auf Kinder und jüngere Erwachsene mit ADHS zuzutreffen (vgl. Herrmann et al., 2010). Einige ADHS-Therapieansätze zielen explizit auf „Monitoring“-Funktionen ab, d.h. auf ein verbessertes Störungsbewusstsein und auf metakognitive Strategien (z.B. Solanto et al., 2010).

Heterogene Befunde zur Selbstwahrnehmung finden sich auch bei Kindern. Während einige Studien bei Kindern mit ADHS eine adäquate Selbstwahrnehmung und ein gewisses Störungsbewusstsein finden (Barber et al., 2005; Bell et al., 2010; Klimkeit et al., 2006; Rizzo et al., 2010), berichten andere Studien, dass Kinder mit ADHS sich trotz deutlich schlechterer Leistungen genau gleich einschätzen wie gesunde Kontrollkinder (Hoza et al., 2002; 2004; 2010; Ohan &

Johnston, 2011, Evangelista et al., 2008; siehe Überblick bei Owens et al., 2007). Dieses Phänomen wird als "positive illusory bias (PIB)" bezeichnet. PIB wurde vereinzelt auch bei Erwachsenen mit ADHS beschrieben (Knouse et al., 2005), tritt aber möglicherweise nur bei einer Untergruppe mit schwerer Symptomatik oder eher bei jüngeren Erwachsenen auf (Jiang, 2010; vgl. Barkley et al., 2011).

Diskrepanzen zwischen Fremd- und Selbstangaben können allerdings auch mit umgekehrten Vorzeichen auftreten, wenn ein generell negatives Selbstbild vorliegt. Erwachsene mit ADHS haben in der Regel eine Vielzahl von Misserfolgen erlebt und hinreichend Erfahrung mit Ablehnung und Scheitern in Schule, Familie, Beziehungen und Berufsleben gemacht (Weyandt & DuPaul, 2006; Barkley et al., 2008). So zeigen auch Untersuchungen zum Selbstkonzept bei ADHS im Erwachsenenalter keine positive Verzerrung, sondern signifikant negativere Selbstkonzepte im Vergleich zu gesunden Kontrollprobanden (Edel et al., 2009; Edbom et al., 2006; Ramsay & Rostain, 2008; Newark & Stieglitz, 2010; Bramham et al., 2009; Philipsen et al., 2007).

Diskrepanzen zwischen Teilbefunden bei der Diagnose von Erwachsenen mit ADHS (z.B. zwischen Interview, Selbst- und Fremdangaben in Fragebögen, objektive Testdaten) können daher ganz unterschiedliche Bedeutungen haben. Für den Diagnostiker, der den Schweregrad der Symptome und deren Auswirkung exekutiver Beeinträchtigung in Alltag und Berufsleben beurteilen möchte, ist es daher schwierig abzuschätzen, welche der Angaben die Schwierigkeiten am zuverlässigsten charakterisieren.

Ziel der vorliegenden Studie war zu untersuchen, ob Erwachsene mit ADHS gemäss Selbstangaben und Fremdangaben in Fragebögen und in objektiven Tests Auffälligkeiten exekutiver Funktionen aufweisen und ob systematische Diskrepanzen zwischen diesen Teilbefunden bestehen. Dazu wurde in einem ersten Schritt der Frage nachgegangen, ob sich Probanden mit und ohne ADHS in ihren Selbstangaben exekutiver Defizite unterscheiden. Zu diesem Zweck wurde Erwachsenen mit und ohne ADHS der Dysexecutive Questionnaire (DEX; Wilson et al., 1996, deutsche Übersetzung Ufer, 2000) vorgelegt, eine Skala zur Erfassung von Störungen exekutiver Funktionen. Dieser Fragebogen, ursprünglich eher für den Einsatz bei Patienten mit Hirnschädigung entwickelt, wurde

bislang noch nicht bei AHDS verwendet. Zusätzlich wurde daher ein zweiter, bereits bei ADHS eingesetzter Fragebogen zur Selbstbeurteilung eingesetzt (z.B. Smilek et al., 2010), der Cognitive Failure Questionnaire (CFQ; Broadbent et al., 1982, deutsche Adaptation von Klumb, 1995), welcher Missgeschicke und kognitive Fehlleistungen in Alltagssituationen abfragt. Es wurde dabei angenommen, dass ADHS-Probanden auf beiden Fragebögen signifikant mehr kognitive Einschränkungen und exekutive Defizite angeben würden als Kontrollprobanden. Zweitens sollte untersucht werden, ob Selbst- und Fremdurteile bei ADHS-Probanden stärker voneinander abweichen als bei Kontrollpersonen. Dazu wurden Diskrepanzen zwischen Selbst- und Fremdurteilen von ADHS- und Kontrollprobanden auf dem DEX verglichen. Da hier die Forschungslage uneinheitlich ist, gingen wir von der Hypothese aus, dass Erwachsene mit ADHS, die bereits im Berufsleben stehen und etwas älter sind, im Selbsturteil nicht stärker von Fremdurteilen abweichen würden als Kontrollprobanden. Schliesslich sollte überprüft werden, ob ein Zusammenhang zwischen Auffälligkeiten in einer Testbatterie exekutiver Funktionen einerseits und Selbst- oder Fremdurteilen im DEX andererseits besteht. In Übereinstimmung mit den meisten bisherigen Befunden (Barkley et al., 2010; Jonsdottir et al., 2006) wurde angenommen, dass dieser Zusammenhang niedrig ausfallen würde. Zum Schluss untersuchten wir, wie sich Erwachsene mit ADHS bezüglich ihres Selbstkonzepts einschätzen und ob Angaben zum Selbstkonzept mit Angaben zu exekutiven Defiziten zusammenhängen. Dabei gingen wir von der Annahme aus, dass bei Erwachsenen mit ADHS das Selbsturteil exekutiver Defizite stärker vom allgemeinen Selbstkonzept beeinflusst ist als bei Kontrollprobanden.

9.4. Methode

9.4.1 Stichprobe

Achtundzwanzig erwachsene Probanden mit ADHS und achtundzwanzig Kontrollprobanden (Altersrange 19 bis 60), einander paarweise nach Geschlecht, Alter und Beruf zugeordnet, nahmen an der Untersuchung teil (vgl. Tabelle 1).

Tabelle 1. *Beschreibung der Stichprobe*

	ADHS (N=28)	**Kontrollen (N=28)**	***p***
Männer (N)	13	13	*n.s*
Frauen (N)	15	15	*n.s*
Alter MW *(SD)*	36.3 (11.2)	36.8 (11.3)	*n.s*
Spanne (Jahre)	21-58	19-59	
WURS-K (*RW*), MW *(SD)*	43.9 (13.9)	16.7 (11.0)	***
FEA-ASB (*RW*), MW *(SD)*	35.8 (7.9)	10.2 (7.6)	***

Anmerkungen. MW = Mittelwert, *SD* = Standardabweichung, *RW* = Rohwert, *n.s.* = nicht signifikant, *** p<.001, *WURS-K* = Wender Utah Rating Scale-Kurzform, *FEA-ASB* = Fragebogen zur Erfassung von ADHS im Erwachsenenalter-aktuelle Probleme Selbstbeurteilung

In die Patientengruppe aufgenommen wurden Männer und Frauen (Mindestalter 19 Jahre), die die Kriterien eines ADHS nach DSM IV-TR (American Psychiatric Association, 1994) erfüllten und die weitgehend ins normale Arbeitsleben integriert sein sollten, um eine weitgehende Vergleichbarkeit mit unauffälligen Erwachsenen zu ermöglichen. Die Forschungsdiagnose wurde anhand des Fragebogens zur Erfassung von ADHS im Erwachsenenalter, aktuelle Probleme– Selbstbeurteilung (FEA-ASB, Döpfner et al., 2006) für aktuelle und der WURS-K (Retz-Junginger et al., 2002) für retrospektive Symptome, sowie anhand eines von einem erfahrenen Kliniker durchgeführten psychiatrischen Kurzinterviews (Mini-Dips, Margraf, 1994) gestellt. Das Interview diente zudem der Erfassung von Komorbiditäten und sollte ausschließen, dass ADHS - Symptome lediglich eine Sekundärsymptomatik im Rahmen einer anderen Störung darstellten. Anamnestisch wurden ebenfalls neurologische Erkrankungen/Hirnschädigung ausgeschlossen.

Anhand dieser Kriterien mussten 11 von 39 Probanden (28 %) der ursprünglichen ADHS-Gruppe ausgeschlossen werden. Von den verbleibenden 28 Probanden, 15 Frauen und 13 Männer, hatten 25 bereits eine ADHS-Diagnose vor Studienbeginn durch einen unabhängigen Kliniker erhalten. Anhand des psychiatrischen Interviews ergaben sich bei fünf der 28 Teilnehmer mit ADHS (18 %) Hinweise auf eine akute komorbide Störung (Depression N = 2, bipolare Störung N = 1, Alkoholmissbrauch N = 1, Depression plus Angststörung plus Essstörung N = 1). Bei weiteren vier Patienten war eine Depression remittierend. Zwölf Patienten nahmen regelmäßig Stimulanzien, die

sie aber 48 Stunden vor der Testuntersuchung abgesetzt hatten. Kein Kontrollproband zeigte Hinweise auf eine psychiatrische Störung. Kontroll- und ADHS-Probanden wurden paarweise zugeordnet nach folgenden Kriterien: ADHS- und Kontrollproband mussten dasselbe Geschlecht aufweisen, derselben Berufskategorie angehören und im selben Altersrange liegen (+/-maximal 5 Jahre). Kontrollprobanden durften keine neurologische Erkrankung und kein ADHS aufweisen (gemäss WURS-K, FEA-ASB, psychiatrischem Interview). Folgende Berufsgruppen waren in der Stichprobe vertreten: Handelskaufmann/-frau (ADHS 2 Männer (M), 3 Frauen (F) : Kontrollen (KO) 2M, 3F); Handwerker (ADHS 4M : Ko 4M); Angestellte/r (ADHS 2 M, 5 F : Ko 2M, 5F); Manager (ADHS 1M : Ko 1M); Medizinisch-soziale Berufe (ADHS 1F : Ko 1F); Kaufmännische Angestellte (ADHS 2M, 2F : Ko 2M, 2F); Wissenschaftler (ADHS 2M : Ko 2M), Hausfrau mit Kindern (ADHS 4F : Ko 4F).

Die Rekrutierung der Probanden mit ADHS erfolgt über die schweizerische Selbsthilfevereinigung ELPOS und über Auslage/Aushang von Studien-Informationen in diversen Institutionen (z.B. Kliniken, Universität, Firmen, bei Ärzten und Psychologen). Kontrollprobanden wurden im beruflichen und privaten Umfeld rekrutiert und ebenfalls über Auslage/Aushang von Studieninformationen in verschiedenen Institutionen. Die Teilnehmer erhielten eine Aufwandsentschädigung von insgesamt 30 SFR.

9.4.2. Instrumente

9.4.2.1 Fragebögen

Das Dysexecutive Questionnaire (DEX) wurde den Probanden zur Selbstbeurteilung und einem nahen Angehörigen ihrer Wahl (Elternteil oder Partner) zur Fremdbeurteilung vorgelegt. Das DEX ist einer von sieben Untertests der Testbatterie „Behavioural Assessment of the Dysexecutive Syndrome (BADS)“ (Wilson et al., 1996) zur Erfassung exekutiver Funktionsstörungen (deutsche Übersetzung von Ufer, 2000). Das DEX Questionnaire beinhaltet Aussagen zu häufigen Schwierigkeiten von Patienten mit dysexekutivem Syndrom. Der Fragebogen umfasst 20 Aussagen, die auf einer fünfstufigen Likert-Skala (von 0 „nie“ bis 4 = „sehr oft“) eingeschätzt werden. Durch

Addition wird ein Gesamtwert gebildet. Ein hoher Wert zeigt Auffälligkeiten bzw. Schwierigkeiten im Alltag an. Ursprünglich eher für Patienten mit erworbener Hirnschädigung entworfen, wurde das DEX inzwischen auch bei anderen Störungsbildern eingesetzt, etwa bei Störungen des schizophrenen Formenkreises (Chan et al., 2011; Laws et al., 2008), Asperger Syndrom (Cederlund et al., 2010) oder Sucht (Llanero-Luque et al., 2008). Als Untertest der BADS war das DEX eher als Screening-Instrument konzipiert und psychometrisch nur unzureichend überprüft. Vom theoretischen Konzept her sollten vier Bereiche exekutiver Kontrolle (Emotion, Motivation, Kognition und Verhalten) erfasst werden, es wurde aber lediglich ein Gesamtwert errechnet. Inzwischen liegen empirische Untersuchungen der Struktur des DEX in verschiedenen klinischen und nicht-klinischen Gruppen vor, mit nicht ganz einheitlichen Ergebnissen (Burgess et al., 1998; Bodenburg & Dopslaff, 2008; Chaytor et al., 2006; Simblett & Bateman, 2011; Mooney et al., 2006; Pedrero-Pérez et al., 2011; Ho et al., 2006; Gerstorf et al., 2008). Bei der Aufteilung in vier empirische Subskalen orientierten wir uns hier an einer Arbeit mit einer gemischten Stichprobe mit überwiegend gesunden Probanden (Mooney et al., 2006, siehe auch Laws et al., 2008) mit den Faktoren 1. Inhibition („inhibition“, aus Items 2, 5, 11, 12, 13, 14), 2. zielgerichtetes Handeln („Intention“, aus Items 17, 18, 19), 3. soziale Regulation („social regulation“, aus Items 4, 7, 8, 11, 16, 20), 4. abstraktes Denken und Realitätsprüfung („cognitive impulsiveness“ aus Items 1, 3, 6, 9). Die letzte Skala setzt sich aus inhaltlich unterschiedlichen Items zusammen, die in einem alternativen 5-Faktoren-Modell getrennt wurden (Mooney et al., 2006). Um die Anzahl Items pro Skala ungefähr vergleichbar zu halten, wurde hier die empfohlene 4-Faktoren Lösung beibehalten. Anders als bei Mooney et al., (2006) wurden die beiden doppelt vertretenen Items (5, 16) jeweils nur in der Skala mit der höchsten Ladung beibehalten.

Der Cognitive Failure Questionnaire (CFQ; Broadbent et al., 1982) wurde von den Probanden als Selbstbeurteilung durchgeführt. Der CFQ fragt kognitive Fehlhandlungen und kleine Missgeschicke im Alltag während der letzten 6 Monate ab (z.B. auf der Straße Verkehrszeichen übersehen; unsicher sein, ob Licht oder Herd ausgeschaltet sind; aus Versehen eine Person anrempeln; den Namen nicht mitbekommen, wenn jemand vorgestellt wurde, etc.). Die hier verwendete deutsche Version des CFQ

von Klumb (1995) umfasst 32 Aussagen, die auf einer fünfstufigen Likertskala (0 = nie; 4 = immer) eingeschätzt werden.

Die Frankfurter Selbstkonzeptskala (FSKN, Deusinger, 1986) wurde zur Erfassung unterschiedlicher Facetten des Selbstkonzepts entwickelt. Die FSKN enthält 78 Items, die 10 Skalen zugeordnet sind: 1. Allgemeinen Leistungsfähigkeit; 2. allgemeine Problembewältigung; 3. Verhaltens- und Entscheidungssicherheit; 4. allgemeine Selbstwertschätzung; 5. Empfindlichkeit und Gestimmtheit; 6. Standfestigkeit gegenüber Gruppen und bedeutsamen Anderen; 7. Kontakt- und Umgangsfähigkeit; 8. Wertschätzung durch Andere; Irritierbarkeit durch Andere; 10. Gefühle und Beziehungen zu Anderen. Der Proband antwortet zu Aussagen zur eigenen Person auf einer sechsstufigen Likert-Skala. Je höher der Skalenwert, desto „positiver“ oder „günstiger“ (sozial erwünschter) ist das Selbstkonzept. Für jede einzelne Skala existieren Normwerte zur Bestimmung eines "negativen", „neutralen“ oder "positiven" Selbstkonzepts.

9.4.2.2. Testverfahren

Es wurden folgende standardisierte Testverfahren eingesetzt: Die Untertests Go/Nogo, Arbeitsgedächtnis, Geteilte Aufmerksamkeit und Reaktionswechsel der TAP (Testbatterie zur Aufmerksamkeitsprüfung, Zimmermann & Fimm, 2002; 2007), einer Computerbatterie zur Überprüfung von Aufmerksamkeitsfunktionen, der HAWIE-R Untertest Zahlennachsprechen vor- und rückwärts (Tewes, 1991), der Corsi-Block Tapping Test zur Erfassung der visuellen Spanne (Schellig, 1997), der Six Elements Test, ein Test zur Erfassung von Zeitmanagement, Prioritätensetzung und Einhalten von Regeln aus der Testbatterie Behavioural Assessment of the Dysexecutive Syndrome (BADS) (Wilson et al., 1996) und der Wisconsin Card Sorting Test (WCST) in einer computerisierten Version mit 64 Karten (Heaton et al., 2008; Kongs et al., 2000).

9.4.3. Durchführung

Die Testuntersuchungen und das Interview fanden am Zentrum für Kinder- und Jugendpsychiatrie der Universität Zürich statt. Fragebögen wurden von den Teilnehmern zuhause ausgefüllt und zur Untersuchung mitgebracht.

9.4.4. Statistische Auswertung

Da das DEX noch nicht bei ADHS-Patienten eingesetzt worden war, wurde bei den Gruppenvergleichen von ADHS und Kontrollprobanden zunächst eine deskriptive Darstellung auf Itemebene gewählt (Selbst- und Fremdbeurteilungen), die nonparametrisch (Mann Whitney-U) auf Gruppenunterschiede hin überprüft wurde. Dies hat explorativen Charakter, weshalb keine Korrekturen für multiple Vergleiche durchgeführt wurden. Zum Gruppenvergleich von Subskalen zwischen Probanden mit und ohne ADHS wurden MANOVAs und posthoc-Vergleiche mit t-Tests durchgeführt. Die Effektgrösse für Mittelwertsvergleiche wird als Cohens d ausgedrückt. Für die Ermittlung der Diskrepanzwerte des DEX wurden einzelne Subskalenrohwerte z-transformiert und anschliessend die Fremdangaben von den Selbstangaben subtrahiert. Die daraus resultierenden Diskrepanzwerte der ADHS- und Kontrollgruppe wurden anschliessend non-parametrisch verglichen (Mann Whitney-U), da Varianzhomogenität nicht gegeben war (Tabelle 3). Zum direkten Vergleich von Selbst- und Fremdeinschätzung wurden MANOVAs mit Messwiederholung der DEX-Subskalen separat für beide Gruppen durchgeführt. Um den Einfluss des Selbstkonzepts auf die Selbsteinschätzung im DEX zu überprüfen, wurde eine ANCOVA mit diagnostischer Gruppenzugehörigkeit als unabhängiger, DEX-Selbst Gesamtwert als abhängiger und FSKN Gesamtwert als Kovariable und eine separate ANCOVA mit der Subskala „Allgemeine Selbstwertschätzung“ der FSKN als Kovariable durchgeführt. DEX -Selbstbeurteilung von ADHS-Subgruppen mit und ohne komorbide depressive Symptome wurden mit MANOVA verglichen. Der Zusammenhang zwischen objektiven Testergebnissen und DEX Selbst- und Fremdbeurteilung wurde korrelativ (Pearson) untersucht. Der Zusammenhang zwischen Selbst- und Fremdangaben von DEX und anderen Verhaltensfragebögen wurde ebenfalls mit Korrelationen nach Pearson berechnet.

9.5. Ergebnisse

9.5.1. Selbst- und Fremdangaben im DEX bei Probanden mit ADHS und bei Kontrollprobanden

Auf Itemebene betrachtet, stuften sich ADHS-Probanden in der DEX-Selbstbeurteilung mit Ausnahme der Items 11, 13 und 20 durchwegs als auffälliger ein als Kontrollprobanden. In den Fremdangaben des DEX wurden ADHS-Probanden in 16 von 20 Items als signifikant auffälliger beurteilt (Tabelle 2).

Tabelle 2. *Gruppenunterschiede zwischen ADHS- und Kontrollprobanden bei Selbst- und Fremdangaben in DEX-Items (Rohwerte)*

	Selbstangaben			**Fremdangaben**		
	ADHS (N=28) MW (*SD*)	**Kontrollen (N=28) MW (*SD*)**	***p***	**ADHS (N=27) MW (*SD*)**	**Kontrollen (N=28) MW (SD)**	***p***
1. Defizite im abstrakten Denkvermögen	2.14 (1.04)	0.96 (0.50	***.001***	1.03 (0.88)	0.82 (0.77)	*.355.*
2. Impulsivität	2.28 (1.18)	1.28 (0.81)	***.001***	1.75 (1.10)	0.85 (0.70)	***.001***
3. Konfabulationsneigung	0.75 (1.10)	0.17 (0.39)	***.025***	0.21 (0.56)	0.28 (0.59)	*.564.*
4. Planungsdefizite	2.39 (1.16)	0.96 (0.79)	***.000***	1.67 (1.33)	0.60 (0.68)	*.****001***
5. Übererregbar	2.64 (0.98)	1.10 (0.78)	***.000***	1.92 (1.01)	0.89 (0.95)	***.000***
6. Probleme der zeitlichen Sequenzierung	1.32 (0.98)	0.67 (0.61)	***.010***	0.60 (0.87)	0.25 (0.51)	*.143*
7. Mangelnde Einsicht und Selbstwahrnehmung	1.67 (1.05)	0.53 (0.63)	***.000***	1.10 (1.10)	0.32 (0.61)	*.****004***
8. Lethargie	1.57 (0.92)	0.85 (0.75)	***.005***	1.46 (1.23)	0.39 (0.62	***.000***
9. Enthemmung	1.57 (1.03)	0.71 (0.76)	***.001***	0.89 (0.83)	0.42 (0.63)	***.030***
10. Variable Motivation	2.21 (0.99)	1.17 (0.72)	***.000***	1.67 (1.02)	0.46 (0.57)	***.000***
11. Affektverflachung	1.75 (1.32)	1.25 (0.79)	.129	1.21 (0.99)	0.67 (0.72)	***.037***
12. Aggressivität	1.96 (1.10)	1.00 (0.86)	***.000***	1.57 (1.06)	0.71 (0.76)	***.001***
13. Fehlendes Einfühlungsvermögen u. Gleichgültigkeit gegenüber den Gefühlen anderer	1.25 (1.07)	1.10 (0.83)	.735	1.32 (1.18)	0.75 (0.84)	*.072.*
14. Perseverationen	1.85 (1.04)	0.75 (0.84)	*.****000***	1.39 (1.31)	0.64 (1.02)	***.020***
15. Motorische Unruhe	2.67 (1.21)	1.25 (1.04)	***.000***	2.03 (1.23)	0.85 (1.00)	***.000***
16. Mangelnde Reaktionsunterdrückung	2.25 (0.92)	0.85 (0.89)	***.000***	1.42 (1.10)	0.60¨(0.73)	***.004***
17. Diskrepanz zwischen Wissen und Verhalten	1.92 (0.97)	0.85 (0.75)	***.000***	1.10 (1.06)	0.53 (0.69)	***.022***
18. Ablenkbarkeit	3.03 (0.92)	1.14 (0.80)	***.000***	2.07 (1.35)	0.57 (0.79)	***.000***
19..Probleme bei der Entscheidungsfindung	2.60 (1.25)	1.42 (0.83)	***.000***	1.96 (1.29)	0.92 (0.89)	***.002***
20. Gleichgültigkeit oder fehlende Einsicht in sozialen Regeln und Normen	1.60 (1.10)	1.10 (0.91)	**.**080.	1.67 (1.05)	0.78 (0.99)	***.001***

Anmerkungen. MW = Mittelwert, *SD* = Standardabweichung, *Mann-Whitney U*-Tests; signifikante Ergebnisse (p<.05) sind fett markiert.

Probanden mit ADHS und Kontrollprobanden unterschieden sich im Gesamtwert des DEX sowohl in Selbst- als auch in Fremdratings (Tabelle 3). Im Gruppenvergleich der empirischen DEX-Subskalen mit MANOVA zeigten sich signifikante Haupteffekte zwischen Probanden mit ADHS und Kontrollen sowohl im Selbsturteil (Wilks Lambda = .461, F (4,51) = 14.919, p = .000) als auch im Fremdurteil (Wilks Lambda = .594, F(4,50) = 8.546, p = .000). Probanden mit ADHS erzielten überall signifikant höhere, d.h. auffälligere Werte (für post-hoc T-Tests siehe Tabelle 3).

Tabelle 3. *Gruppenunterschiede zwischen ADHS- und Kontrollprobanden in empirischen Subskalen des DEX (Selbst- und Fremdbeurteilung) und in Diskrepanzwerten der DEX-Subskalen*

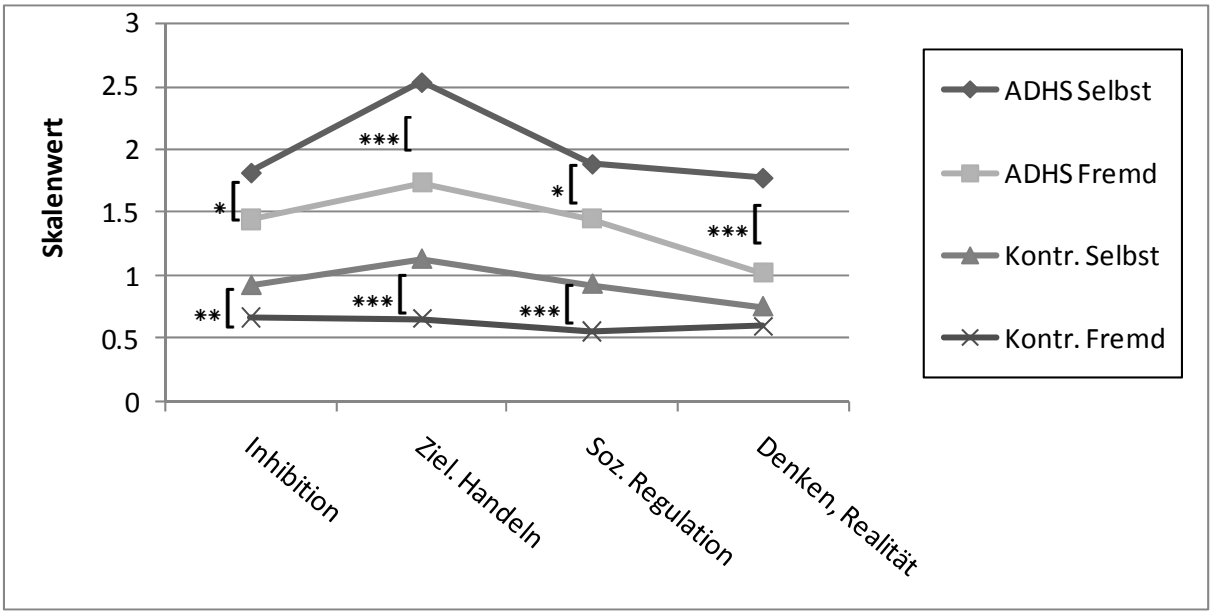
	ADHS MW (*SD*)	**Kontrollen MW (*SD*)**	***p***	***ES***
DEX- Selbstbeurteilung (*RW*)°	**(N=28)**	**(N=28)**		
Inhibition - Selbst	12.7 (4.2)	6.5 (4.2)	***.000***	1.50
Zielgerichtetes Handeln - Selbst	7.6 (2.2)	3.4 (1.9)	***.000***	2.09
Soziale Regulation - Selbst	11.3 (4.2)	5.6 (3.1)	***.000***	1.56
Abstraktes Denken /Realitätsbezug- Selbst	7.1 (3.0)	3.0 (1.6)	***.000***	1.75
Gesamtwert - Selbst	39.5 (12.5)	19.2 (9.7)	***.000***	1.85
DEX- Fremdbeurteilung (*RW*)°	**(N=27)**	**(N=28)**		
Inhibition – Fremd	10.1 (4.1)	4.7 (3.9)	***.000***	1.39
Zielgerichtetes Handeln - Fremd	5.2 (2.7)	2.0 (1.8)	***.000***	1.41
Soziale Regulation - Fremd	8.7 (4.6)	3.4 (3.0)	***.000***	1.38
Abstraktes Denken /Realitätsbezug - Fremd	4.1 (1.9)	2.4 (2.0)	***.002***	0.88
Gesamtwert - Fremd	27.9 (11.3)	12.4 (9.6)	***.000***	1.51
Diskrepanzwerte [DEX-Selbst (*z*-Wert) minus Dex-Fremd (*z*-Wert)]+	**(N=27)**	**(N=28)**		
DIFF Inhibition	.025 (1.083)	-.041 (.622)	*.946*	
DIFF Zielgerichtetes Handeln	.125 (1.04)	-.151 (.063)	*.485*	
DIFF Soziale Regulation	-.012 (1.23)	.053 (.601)	*.788.*	
DIFF Abstraktes Denken und Realitätsbezug	.236 (1.31)	-.261 (.805)	*.111*	
DIFF Gesamt	.375 (4.02)	-.508 (2.16)	*.320*	

Anmerkungen. MW = Mittelwert, *SD* = Standardabweichung, *RW* = Rohwert, ° = *T*-Tests, + = Mann Whitney-U; signifikante Ergebnisse (p<.05) sind fett markiert. *ES* = Effektstärke (Cohens d)

Tabelle 3 ist zu entnehmen, dass Diskrepanzwerte aus den DEX Selbst- und Fremdangaben weder auf Subskalen-Ebene noch im Gesamtwert (DIFF DEX Gesamt) zwischen den Gruppen mit und ohne ADHS unterschieden. Dies zeigt, dass Selbstangaben bei Erwachsenen mit ADHS nicht stärker von Fremdangaben abweichen als das bei gesunden Kontrollprobanden der Fall ist.

Selbstangaben und Fremdangaben in den DEX-Subskalen unterschieden sich im direkten Vergleich sowohl bei den ADHS-Patienten (Wilks Lambda = .507, F(4,23) = 5.597, p = .003) als auch bei den Kontrollprobanden (Wilks Lambda = .524, F(4,24) = 5.450, p<.003) signifikant voneinander. Dabei wurden in beiden Gruppen auf allen Subskalen stärkere Beeinträchtigungen im Selbsturteil als in den Fremdbeurteilungen angegeben (Abbildung 1). Die einzige Ausnahme bildet die Subskala „Abstraktes Denken und Realitätsbezug“ bei den Kontrollprobanden, für die Unterschiede zwischen Selbst- und Fremdbeurteilung nicht signifikant wurden.

Abbildung 1. *Unterschiede zwischen Selbst- und Fremdangaben in den DEX-Subskalen bei ADHS- und Kontrollprobanden*



Anmerkungen. Selbsturteil > Fremdurteil: *** p<.001; ** p<.01, * p<.05; Skalenwert = Summenscore / Anzahl Items pro empirische Subskala mit Werten von 0 (keine Beeinträchtigung) bis 4 (starke Beeinträchtigung). Selbst = Selbstrating, Fremd = Fremdrating,

Um zu ermitteln, ob depressive Symptome die Selbsteinschätzung im DEX beeinflussen, wurden der DEX-Gesamtwert von ADHS-Subgruppen mit (N = 10) und ohne komorbide depressive Symptome (N = 17) verglichen. Dabei zeigte sich kein signifikanter Unterschied im DEX-Selbsturteil zwischen Patienten mit und ohne depressive Symptome (t = -.952, p<.355). Eine zusätzliche MANCOVA der DEX Subskalen mit Geschlecht als Kovariable erbrachte keinen signifikanten Geschlechtseffekt (Wilks Lambda = .979, F(2/50) = .539, p<.587) und keine signifikante Interaktion zwischen Geschlecht und Diagnosegruppe (Wilks Lambda = .978, F(2/50) = .568, p<.573).

9.5.2. DEX –Urteile und Leistungen in objektiven Testverfahren

Insgesamt ergaben sich nur wenige signifikante Unterschiede zwischen Probanden mit und ohne ADHS in objektiven Testleistungen (Tabelle 4). ADHS-Probanden zeigten im Vergleich mit Kontrollprobanden signifikant verminderte Leistungen im Corsi Block-Tapping-Test, im Wisconsin Card Sorting Test – „Perseverative Fehler", im TAP Arbeitsgedächtnis – Auslasser und in TAP Reaktionswechsel Median, Standardabweichung und -Fehler.

Tabelle 4. *Gruppenunterschiede zwischen ADHS- und Kontrollprobanden in den Testleistungen*

	ADHS (N=28) MW *(SD)*	**Kontrollen (N=28) MW *(SD)***	***p***	***ES***
Zahlen Nachsprechem (Hawie-R)(WP) Vor- und Rückwärts	9.4 (3.6)	10.5 (3.1)	*.247*	.33
Corsi Block-Tapping-Test Längste Sequenz	4.9 (0.8)	5.5 (0.8)	***.011***	.76
Wisconsin Card Sorting Test	10.8 (8.4)	6.5 (3.1)	***.024***	.69
Perseverative Fehler (***RW)***	3.1 (1.7)	3.5 (1.4)	*.313*	.26
Vollendete Kategorien ***(RW)***				
Six Elements Test (BADS) Gesamtprofilwert	3.48 (0.7)	3.78 (0.4)	*.069*	.54
TAP				
Geteilte Aufmerksamkeit				
Median *(ms)*	698 (79)	676 (59)	*.257*	.32
SD (*ms*)	192 (74)	198 (67)	*.757*	.09
Fehler	1.4 (2.9)	0.7 (0.9)	*.252*	.33
Auslasser	1.5 (1.8)	1.5 (1.5)	*1.00*	.00
GoNogo				
Median (*ms*)	435 (102)	426 (70)	*.684*	.01
SD (*ms*)	80 (36)	76 (24)	*.693*	.13
Fehler	1.2 (3.8)	0.5 (1.3)	*.308*	.25

Arbeitsgedächtnis	692 (168)	621 (206)	*.162*	.38
Median (*ms*)	245 (120)	246 (146)	*.982*	.01
SD (*ms*)	2.2 (2.3)	2.3 (2.9)	*.333*	.04
Fehler	4.3 (3.6)	1.8 (2.0)	***.033***	.87
Auslasser				
Reaktionswechsel	965 (302)	787 (147)	***.007***	.76
Median (*ms*)	348 (223)	251 (120)	***.047***	.55
SD (*ms*)	5.9 (7.3)	2.5 (4.6)	***.047***	.57
Fehler				

Anmerkungen. *T*-Tests, MW = Mittelwert, *SD* = Standardabweichung, *RW* = Rohwert; signifikante Ergebnisse (p<.05) sind fett markiert; *ES* = Effektstärke (Cohens d), *ms* = Millisekunden

Um den Zusammenhang zwischen Fragebogenverfahren und exekutiven Testleistungen zu untersuchen, wurden nur Testverfahren berücksichtigt, die im direkten Gruppenvergleich eine mittlere Effektstärke von mindestens d >.50 erreicht hatten (Tabelle 4).

Tabelle 5. *Korrelationen zwischen exekutiven Testleistungen und Selbst- und Fremdangaben zu exekutiven Einschränkungen von ADHS- und Kontrollprobanden*

Testverfahren	**DEX Selbsturteil** (N=56)	**DEX Fremdurteil** (N=55)
Block-Tapping-Test	-.200	-.037
WCST Perseverative Fehler	-.320*	-.295*
Six-Elements BADS Profilwert	-.125	-.248
Arbeitsgedächtnis TAP Auslasser	.137	.087
Reaktionswechsel TAP		
Median	.209	.300*
SD	.176	.182
Fehler	-.452**	.122

Anmerkungen. *n.s.* = nicht signifikant, ** $p<0.01$, * $p<0.05$

Wie in Tabelle 5 dargestellt, korrelierten sowohl Fremd – als auch Selbstangaben im DEX nicht oder nur schwach mit exekutiven Testleistungen. Lediglich in einem Fall, bei der Korrelation von DEX-Selbsturteil und TAP Reaktionswechsel Fehler, zeigte sich ein Zusammenhang von mittlerer Stärke.

9.5.3. Zusammenhang von DEX und anderen Selbsteinschätzungsskalen

Probanden mit ADHS schätzten sich auch hinsichtlich kognitiver Fehlleistungen im CFQ (Tabelle 6) als stärker beeinträchtigt ein als Kontrollprobanden. Ihr Selbstkonzept gemäss Selbsturteil im FSKN war signifikant negativer gefärbt als das von Kontrollprobanden. Dies ergab eine ANOVA zum Gruppenvergleich des FSKN Gesamtwertes und eine MANOVA über die 10 FSKN-Subskalen (Tabelle 6). Die Werte der FSKN-Subskalen „Problembewältigung", „Verhaltens- und Entscheidungssicherheit", „Empfindlichkeit- und Gestimmtheit" und „Gefühle und Beziehungen zu Anderen" lagen bei ADHS-Probanden im negativen Selbstkonzeptbereich. Die Werte aller übrigen FSKN-Skalen waren im neutralen Bereich angesiedelt. Bei Kontrollprobanden lagen die Mittelwerte der FSKN-Skalen im neutralen und positiven Bereich, außer bei der FSKN-Skala „Problembewältigung" (Tabelle 6).

Tabelle 6. *Selbstbeurteilung in Cognitive Failure Questionnaire (CFQ) und Frankfurter Selbstkonzeptskalen (FSKN) durch ADHS- und Kontrollprobanden*

	ADHS (N=28) MW (*SD*)	**Kontrollen (N=28)** MW (*SD*)	***p***	***ES***	***Selbstkonzeptvalenz ADHS / Kontrollen***
CFQ gesamt	72.0 (20.4)	33.1 (12.4)	***.000***	2.35	
FSKN gesamt	251.0 (24.4)	283.2 (24.6)	***.000***	1.35	
FSKN-Skalen					
1. Leistungsfähigkeit	32.2 (4.1)	35.1 (2.6)	***.003***	.86	neutral / neutral
2. Problembewältigung	28.3 (5.4)	26.7 (3.1)	*.168*	.37	negativ / negativ
3. Verhaltens- / Entscheidungssicherheit	18.0 (3.5)	19.7 (8.4)	*.378*	.27	negativ / neutral
4. Allg. Selbstwertschätzung	34.8 (4.7)	39.3 (4.8)	***.001***	.96	neutral / neutral
5. Empfindlichkeit / Gestimmtheit	15.0 (3.0)	21.0 (3.5)	***.000***	1.87	negativ / neutral
6. Standfestigkeit	43.3 (10.5)	50.8 (6.8)	***.003***	.86	neutral / positiv
7. Kontakt- und Umgangsfähigkeit	20.9 (3.3)	19.5 (2.3)	*.070*	.50	neutral / neutral
8. Wertschätzung durch Andere	20.2 (4.4)	25.1 (3.7)	***.000***	1.23	neutral / positiv
9. Irritierbarkeit durch Andere	19.5 (6.0)	26.2 (4.0)	***.000***	1.34	neutral / positiv
10. Gefühle u. Beziehungen zu Anderen	17.7 (3.2)	20.3 (2.4)	***.001***	.94	negativ / neutral

Anmerkungen. *T*-Tests, MW = Mittelwert, *SD* = Standardabweichung, *ES* = Effektstärke (Cohens d); signifikante Ergebnisse (p<.05) sind fett markiert.

Zur Überprüfung des Einflusses des Selbstkonzepts auf das DEX-Selbsturteil mittels ANCOVA (mit FSKN Gesamtwert als Kovariable) zeigte sich lediglich ein signifikanter Effekt für den FSKN Gesamtwert (F = 6.762; p = .012), aber kein signifikanter Gruppenunterschied (F = .226, p = .636)

und kein signifikanter Interaktionseffekt (F = .881, p = .352). Das bedeutet, dass sich das Selbstkonzept bei ADHS-Probanden und Kontrollen gleichermassen auf die Selbstbeurteilung im DEX auswirkt und kein störungsspezifischer Bias vorliegt.

Die Korrelation von DEX Selbst- und Fremdurteil mit Gesamtwerten von FSKN, CFQ, FEA-ASB, WURS-K (Tabelle 7) erbrachte mittlere (DEX-Fremdurteil) und mittlere bis hohe Übereinstimmungen (DEX-Selbsturteil) mit den anderen Selbstbeurteilungsskalen, am höchsten zwischen DEX-Selbsturteil und CFQ (r = .784).

Tabelle 7. *Korrelationen zwischen DEX – Gesamtwerten (Selbst- und Fremdangaben) und anderen Selbstbeurteilungsskalen von ADHS- und Kontrollprobanden (n=56)*

	DEX Selbst	DEX Fremd	CFQ	FSKN	FEA-ASB	WURS-K
1. DEX Selbst	1					
2. DEX Fremd	.610**	1				
3. CFQ	.784**	.491**	1			
4. FSKN Gesamt	-.599**	-.499**	-.616**	1		
5. FEA ASB Gesamt	.756**	.573**	.849**	-.656**	1	
6. Wurs-k Gesamt	.629**	.616**	.756**	-.572**	807**	1

Anmerkungen. ** $p<0.01$

9.6. Diskussion

Im Rahmen vorliegender Untersuchung wurde der Frage nachgegangen, ob Erwachsene mit ADHS reliable Selbstangaben über exekutive Defizite im Alltag machen können. Dies ist unseres Wissens die erste Studie, die das DEX bei ADHS-Probanden einsetzt.

Im Einklang mit unserer Hypothese gaben Erwachsene mit ADHS signifikant mehr exekutive Defizite im DEX an als Kontrollprobanden. Auch die Fremdangaben im DEX wiesen auf stärkere Beeinträchtigungen bei Erwachsenen mit ADHS im Vergleich zu Kontrollprobanden hin.

Entsprechend fanden wir in unserer Studie keine Belege dafür, dass Erwachsene mit ADHS ihre Beeinträchtigungen generell nicht wahrnehmen. Im Gegenteil: ADHS-Patienten und Kontrollen schätzen sich beide im DEX selbst als stärker beeinträchtigt ein als sie von ihren Angehörigen beurteilt werden. Dass Angehörige im Fremdurteil weniger Beeinträchtigungen angeben als die Befragten im Selbsturteil, wurde bereits früher in einer Normalpopulation (Chan et al., 2011) und bei Patienten mit Multipler Sklerose (Smith & Arnett, 2010) berichtet und scheint ein normales Phänomen zu sein. Eine Erklärungsmöglichkeit ist, dass relativ geringfügige exekutive Leistungseinschränkungen von den Betroffenen selbst wahrscheinlich deutlicher wahrgenommen werden als von der Umgebung und zu kritischeren Selbsturteilen führen.

In einem zweiten Schritt gingen wir der Frage nach, ob trotz der Gruppenunterschiede in den Selbstangaben, dennoch eine Unterschätzung der tatsächlichen Beeinträchtigungen seitens der ADHS-Probanden vorlag. Ein Vergleich der Diskrepanzwerte ergab keine signifikanten Unterschiede zwischen ADHS-Probanden und Kontrollprobanden. Selbstangaben von ADHS-Probanden weichen ganz offensichtlich nicht stärker im Mittel von den Angaben der Angehörigen ab, als dies bei gesunden Kontrollprobanden der Fall ist. Unterschiedliche Streuungen der Diskrepanzwerte weisen allerdings daraufhin, dass das Spektrum bei ADHS weiter ist und in Einzelfällen deutliche Abweichungen möglich sind. Generell aber gibt es, wie ursprünglich angenommen, keine Anhaltspunkte für eine systematische, störungsspezifische Verzerrung im Sinne einer Über- oder Unterschätzung im Vergleich zum Fremdurteil im DEX.

Wir untersuchten in einem dritten Schritt, ob ein Zusammenhang zwischen Auffälligkeiten in objektiven Testverfahren und Selbst- und Fremdangaben besteht. Es ergaben sich nur wenige signifikante Gruppenunterschiede in einzelnen exekutiven Testverfahren zwischen Erwachsenen mit ADHS und Kontrollpersonen, was in Übereinstimmung mit der - nicht sehr konsistenten - Literatur zu EF–Störungen bei ADHS im Erwachsenenalter steht (vgl. Boonstra et al., 2005). Insgesamt konnten nur wenige, geringe bis moderate Zusammenhänge zwischen exekutiven Testverfahren und Fragebogenverfahren zu alltagsrelevanten kognitiven Beeinträchtigungen und exekutiven Funktionen sowie dem Selbstkonzept belegt werden. Auch dieser Befund ist nicht überraschend, da der geringe

Zusammenhang zwischen verschiedenen exekutive Testverfahren und Angaben in Fragebogenverfahren oder Alltagsbeobachtungen von Patienten mit exekutiven Defiziten immer wieder berichtet wurde (Burgess et al., 1998; Chaytor et al., 2006; Wood & Liossi, 2006; Anderson et al., 2002; Mangeot et al., 2002; Vriezen & Pigott, 2002).

Im Rahmen unserer vierten Fragestellung untersuchten wir, wie sich Erwachsene mit ADHS in Hinblick auf ihr Selbstkonzept einschätzen und ob das Selbstkonzept die Wahrnehmung kognitiver Einschränkungen im Alltag beeinflusst. ADHS-Probanden wiesen im Gesamt-Wert und in den meisten Selbstkonzept-Subskalen ein negativeres Selbstkonzept auf als Kontrollprobanden. Dieses Ergebnis steht im Einklang mit den bisherigen Studien, die den Zusammenhang von ADHS und Selbstwert untersucht haben (Edel et al., 2009; Bussing et al., 2000; Serretti et al., 2005; Newark & Stieglitz, 2010; Bramham et al., 2009; Philipsen et al., 2007). Es fanden sich zwar Hinweise, dass generell das Selbstbild auch das Selbsturteil im DEX beeinflusst, allerdings traf das auf ADHS-Patienten und Kontrollprobanden gleichermassen zu und scheint nicht zu störungsspezifischen Verzerrungen der Selbstbeobachtung zu führen.

Insgesamt sprechen die Befunde für eine akkurate Selbsteinschätzung von Erwachsenen mit ADHS und bestätigen die in anderen Studien beschriebene Spezifität des DEX bei der Erfassung exekutiver Defizite (z.B. Smith & Arnett, 2010).

9.6.1. Einschränkungen

Die vorliegende Stichprobe bestand aus ADHS-Probanden, die beruflich integriert waren, sich grösstenteils in Behandlung befanden und freiwillig an der Untersuchung teilnahmen. Es ist anzunehmen, dass Patienten, die sich auf freiwilliger Basis für eine diagnostische Abklärung melden, eine grössere Aufmerksamkeit gegenüber ihren eigenen Problemen besitzen und entsprechend eine geringere Tendenz aufweisen, die eigenen Symptome zu unterschätzen (siehe dazu Kivisaari, 2008). Zwar mag das generell auf eine In-Anspruchnahme-Population von Erwachsenen mit ADHS zutreffen (Surman et al., 2010). Trotzdem ist anzunehmen, dass es sich bei den hier untersuchten ADHS-

Probanden, angesichts der guten beruflichen Integration und der vergleichsweise geringen Komorbidität, um Patienten mit leichteren Beeinträchtigungen zu handeln. Inwiefern sich die Ergebnisse also auf andere Erwachsene mit ADHS generalisieren lassen, müsste weiterhin untersucht werden.

9.6.2. Konklusion

Zusammenfassend konnte die vorliegende Studie zeigen, dass Erwachsene mit ADHS sich in exekutiven Funktionen als deutlich beeinträchtigt wahrnehmen und dass sich diese Wahrnehmung mit Fremdeinschätzungen weitgehend deckt. Dabei geben Angehörige geringere Beeinträchtigungen an als die Betroffenen selbst. Im Einklang mit bisherigen Studien wiesen Erwachsenen mit ADHS signifikant negativere Selbstkonzepte auf als Kontrollprobanden, was aber nicht zu verzerrten Selbsteinschätzungen führt. Unsere Befunde liefern ausserdem zusätzliche Belege dafür, dass exekutive Testverfahren alltagsrelevante Beeinträchtigungen nur wenig abbilden. Daher sollten, neben den exekutiven Testverfahren, Fragebogenverfahren zu exekutiven Funktionsstörungen mit in die Diagnostik einbezogen werden. Es ist dabei zu bedenken, dass Diskrepanzen zwischen Quellen nicht immer als Zeichen von Dysfunktionalität oder pathologischer Verzerrung gedeutet werden müssen, sondern in bestimmtem Ausmass auch auf methodische Ursachen zurückgeführt werden können.

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9.6.3. Literatur

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10. General Discussion

The present thesis deals with the self-perceptions and self-concepts of patients with ADHD. The disorder has been associated with a wide range of social, emotional and cognitive sequelae. This accumulation of negative experiences has an impact on therapy-relevant factors, such as the individual's self-perceptions of competence and self-esteem, which in turn may advocate maladaptive coping strategies and interfere with treatment. Awareness of one's own deficits may serve a motivating function in behavioural treatment, whereas inaccurate estimations of self-competence and negative self-concepts may interfere with treatment progress. Insufficient self-regulation and reduced awareness of self-regulatory skills in ADHD, in particular, have been discussed as a possible source of negative outcomes in ADHD. It has been argued that repeated difficulties in regulating behaviour in learning situations and interactions with others may result in a child developing a negative self-image, which in turn may lead to decreased motivation and become a self-fulfilling prophecy as the child experiences poor self-regulation and school failure (Blair & Diamond, 2008). Therefore, early assessment and intervention promoting self-regulation, accurate self-perception and metacognitive skills are crucial. In view of the fact that ADHD is a disorder that persists in up to two thirds of the children into adulthood (Faraone et al. 2006), it remains unclear whether eventual inaccurate self-perceptions are something that children with ADHD eventually outgrow, or whether they persist into adolescence and adulthood.

Thus, the overarching goal of the present thesis was to investigate whether young school children and adults with ADHD are able to make accurate judgments of their self-regulatory skill when assessed with an ecologically valid and appropriate instrument. Existing studies of self-perceptions and self-concepts in patients with ADHD have yielded mixed results, probably due to different methodological approaches and inappropriate instruments used. Generally, instruments used to assess metacognitive knowledge are designed for older children and adults, presumably due to the fact that questionnaires relating to abstract verbal concept are too difficult to be understood by

younger children. In addition, it has been questioned whether patients with ADHD may be able to make accurate self-judgments on their regulatory skills.

10.1. General conclusions of the present findings

10.1.1. Aims of the studies

Study 1 aimed at developing and evaluating an instrument for the assessment of metacognitive knowledge of self-regulatory skills in young school children – the Self-rating of Self-Regulatory Function (SelfReg). It was assumed that young school children are able to rate self-regulatory skills accurately when items are presented in an ecologically valid and age-appropriate form. Studies 2 and 3 examined the accuracy of self-perceptions of self-regulatory skill in children and adults with ADHD. In both studies we hypothesised that ADHD patients would rate themselves accurately as being more impaired than normal controls. Given that results in study 2 indicated a moderate tendency toward a positive bias, we additionally explored whether it is possible to detect subgroups within the total sample of children who systematically under- or overestimated skills, compared to adults' ratings.

10.1.2. General findings of the three studies

Consistent with our hypothesis, results of study 1 demonstrated that normally developing children as young as eight to ten years old are able to make accurate judgments on their self-regulatory skills on an age-appropriate instrument in which they are given the possibility to compare their own behaviour to that of others, instead of relating their behaviour to abstract verbal statements. The validity and sensitivity of the newly developed Self-Reg Scale was confirmed. As hypothesised, studies 2 and 3 revealed that children and adults with ADHD are able to provide accurate self-perceptions of their self-regulatory skills when tested with an ecologically valid and appropriate instrument. Both studies

therefore contributed to the evidence base suggesting an accurate self-report of problems in the general ADHD population. It is important to note that findings in studies 2 and 3 persisted when controlling for possible confounding depressive symptoms.

In study 2, however, effect sizes indicated a tendency toward a positive bias after all, when children with ADHD were compared to controls. Therefore an additional exploratory cluster analysis was performed. Results offered evidence for characteristic overestimation, as well as for underestimation or accurate estimation of skills in different subgroups of children with ADHD. Children belonging to the "positive bias" group were slightly younger and tended to have lower IQ scores than other children with ADHD. This was in accordance with the "metacognitive deficit" explanation of PIB (e.g. Poissant, 2005), but in contrast to recent studies claiming that the PIB persists in ADHD over the years (Hoza et al. 2010).

In accordance with previous findings assessing the self-concept of patients with ADHD by means of questionnaire (Edel et al. 2009; Newark & Stieglitz, 2010; Bramham et al. 2009; Philipsen et al. 2007), adults with ADHD in the present study presented with significantly lower self-concepts compared to controls.

10.1.3. Preference for behavioural questionnaires over executive function tests in the prediction of daily life impairments

Study 3 provided further support for the findings of previous studies postulating greater predictive power of behavioural questionnaires over executive function tests in the assessment of executive impairments in daily life of patients with ADHD (Biederman et al. 2007; Barkley & Murphy, 2010). To our knowledge, this is the first study using the DEX (Wilson et al. 1996) in a sample of patients with ADHD. Our results confirmed the specificity of the DEX described in other studies addressing executive deficits in every day life (e.g. Smith & Arnett, 2010).

Executive deficits have often been described in children and adults with ADHD. Research on executive deficits in ADHD routinely relies upon tests of executive function as the primary source for determining the existence of executive function deficits (Biederman et al. 2006; Boonstra et al. 2005;

Wilcutt et al. 2005). However, research examining patients who show deficits on executive function tests, reports low or no ecological validity when judged against ratings of executive function in daily life, or against direct observation of executive function performance in natural settings (Burgess et al. 1998; Chaytor et al. 2006; Wood & Liossi, 2006; Anderson et al. 2002; Vriezen & Pigott, 2002).

In the present study, self-rating scales of executive function in daily life activities indicated more severe impairments as compared to executive function tests. Our findings are in agreement with the previous studies showing that correlation between informant- reports of deficits in EF and results of EF-test are low. We conclude that self-report of EF on standardized instruments – in addition to informant reports - may constitute a more reliable source of problems in daily adaptive functioning than EF tests.

10.2. Limitations of the present studies

Study 1 examined normally developing children and children with impaired self-regulatory skills and various types of behavioural, developmental or academic difficulties aged eight-to-ten years. One limitation is probably the age range of the children of this validation and clinical sample, which was closer to the age ten than to eight. The age range was similar in the sample of children with ADHD (study 2), so that no final conclusions can be drawn on the accuracy of self-perceptions in normally developing children and children with ADHD younger than age eight. However, we would argue that the SelfReg should also be used with even younger children. Finally, in study 1 the clinical sample was relatively small; further studies should use larger sample sizes and test the scale on younger children.

Our findings should also be considered in the context of an additional limitation, based on the instrument we used. Compared to other studies on the PIB, in study 2 we could not rely on matched self-report and informant forms in order to establish discrepancy scores between children's and adults' ratings. The necessary aggregation of two Self-Reg subscales into one, to match adults' report inattention subscales, may represent a further methodological weakness. Furthermore, in the absence

of viable alternatives, we had to create supplementary items on motivation and speed of processing for parents and teachers, which have not been evaluated yet for psychometric properties. Finally, given the small subsample sizes, generalisation of the present findings on under- and overestimation of self-regulatory skills may be questioned. Thus, the exploratory nature of this part of analyses should be emphasised.

The sample in study 3 was a) professionally well integrated, b) mostly receiving treatment and 3) self-referred for participation to the study. It can be assumed that adults with ADHD volunteering for study participation might display a greater attention towards their problems than the general adult ADHD population. Given that the present sample was relatively low in comorbidity, it could be additionally hypothesised that patients in the present study demonstrated milder impairments. Results might therefore not generalise to a broader population of patients with ADHD.

10.3. Implications

Despite of these considerations on limitations, the results of the present studies show that ecologically valid and age-appropriate self-report scales such as the SelfReg or the DEX can help identify self-regulatory deficits in children and adults with ADHD. Moreover, these scales may be an economical screening measure for subsequent referrals to more comprehensive ADHD diagnostic assessment. Future diagnostic assessment may benefit from including the more ecological valid self-report, in addition to executive function tests, when determining executive impairments. The information gained could help to establish the extent of help required and the type of intervention. The present data also indicates that it is possible to preserve some level of self-awareness of deficits, even with executive functioning impairments that affect daily behaviour and performance on objective cognitive tests. Future work (e.g. replication of these findings) is needed to increase understanding of the relationship between executive function deficits in ADHD and impaired awareness of these deficits. Further research with larger samples is warranted to determine whether this association exists in different populations with different levels of executive function and self-awareness.

Finally, these findings suggest that over- and underestimation of self-regulatory skills is not universal to ADHD, but may be restricted to a distinct subgroup of ADHD patients whose special characteristics and developmental risks remain to be fully described. In the majority of cases, however, self-reports from patients with ADHD seem to constitute a reliable and important source of information for clinical intervention.

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12. Appendix

Appendix I. *Self-Rating Scale of Self-Regulatory Function (SelfReg)*

Emotional Control

Pascal, Joel and Tim play „Connect 4“ at Pascal‘s home. Pascal is the first to have placed all four figures in the goal.

1. Joel gets angry and throws all figures all over the play ground.
2. Tim thinks „it‘s a pity I lost”, but keeps calm.

What about you? Do you keep calm if you lose a game?

Simon and Benjamin would like to watch a film. Their parents don’t allow them to stay up longer than usual.

1. Simon gets angry and can’t calm himself down.
2. Benjamin is a bit upset but is able to calm himself down quickly.

What about you? Do you get angry and can’t calm yourself down, if your parents forbid you to do something?

Dominic has invited Fabian and Nick to his birthday party. Dominic chooses three children to play a game. Fabian and Nick have not been chosen for this game.

1. Fabian tries to keep his good mood telling himself: “I'm sure I'll be chosen for a next game."
2. Nick immediately gets into a bad mood. He leaves the room and shuts the door.

What about you? Do you get into a bad mood if other children don’t choose you for a game?

Luca and Michael have discovered a new game in the shop. Their parents don’t allow them to buy the game.

1. Luca accepts it and stays calm.
2. Michael gets very upset.

What about you? Do you accept it and stay calm, if your parents don’t allow you to buy something?

Motivation

The children have to solve a difficult problem and have difficulty to find the solution.

1. Roman tries to solve the problem for another while.
2. Dario loses his patience after a short while and does not continue. If something doesn‘t work right away, Dario gives up.

What about you? Do you try to solve a problem for a while, even if it’s difficult?

Ivo and Nico don’t like to do their homework.

1. For Ivo it is important to be good at school. He does his homework right after school.
2. Nico does not care. For him it is not important to be good at school. He always needs to be told to do his homework.

What about you? Do you have to be told to do your homework, even though you know that it is important?

Yves and Allan have read a story for the school. They both think that reading is boring.

1. Yves has read the story only because he is allowed to stay overnight at his friend's.
2. Allan has read the story without being allowed to do something he likes afterwards.

What about you? Do you only do boring things if afterwards you are allowed to do something you like?

The children do their homework.

1. Jeremy only makes an effort if his mother praises him.
2. Jan does not need to be praised by his mother to make an effort.

What about you? Do you make an effort at what you are doing even if your mother does not praise you?

Motor Activity

Yves and Marc go shopping with their parents.

1. Yves runs away all the time and touches all kinds of things in the shops.
2. Marc stays with his parents and does not touch things when he is not allowed to.

What about you? Do you stay with your parents when you go shopping?

Alexander and Manuel are sitting in the classroom.

1. Alexander sits still on his chair during the whole lesson.
2. Manuel swings backwards and forwards on his chair or fidgets with his arms or legs all the time.

What about you? Do you sit still on your chair during the whole lesson?

Lukas and Alessandro do their homework.

1. Lukas repeatedly rises from his chair. He goes to his room to get something or does something else.
2. Alessandro sits still during all his homework time.

What about you? Do you rise from your chair to do other things during your homework time?

It rains and David and Marco can't go outside to play.

1. David is constantly on the move. He jumps on the sofa, runs through the apartment or climbs on the furniture.
2. Marco quietly draws pictures in his room.

What about you? Are you always on the move, so that you jump, run or climb at home?

Inhibition

The teacher asks a question related to today's topic "My family".

1. Daniel raises his hand and answers only when the teacher asks him to.
2. Ivan shouts out the answer in class without raising his hand.

What about you? Do you shout out an answer in class without raising your hand?

Leon and Florian are late. They should have been at home half an hour ago.

1. Leon crosses the road without looking right or left.
2. Florian stops at the road boarder. Before crossing the street he looks right and left.

What about you? Do you first look right and left before crossing the road?

Patrick and Tobias fancy some sweets. Their mother says: “You will have to wait until after lunch for sweets”.

1. However, Patrick would like some sweets now. He tries nonstop to get some before lunch time.
2. Tobias accepts it without fussing and waits until after lunch time.

What about you? Can you wait until you are allowed something?

Christmas eve is approaching and some presents are already under the Christmas tree.

1. Simon does not touch them and waits until Christmas eve.
2. Luca is excited and starts to scan the presents. He wants to find out what’s inside.

What about you? Do you wait until Christmas eve without touching your presents?

Speed of Processing

The teacher says: „Once you have finished these two math problems you can go for a break!“

1. Alex is playing outside for some time. He was as quick as his friends.
2. Fabian is still solving the math problems while his friends are playing outside.

What about you? Do you still have to finish your task while the other children can go for a break?

Patrick and Lukas solve a problem in the classroom. Lukas finishes before Patrick.

1. If Patrick wants to solve a problem without making mistakes, he needs more time than other children in his class.
2. If Lukas wants to solve a problem without making mistakes, he needs as much time as other children in his class.

What about you? Do you need as much time as other children in your class when you want to solve a problem without making mistakes?

The children have to learn a poem for the school.

1. Leon thinks he needs as much time as other children in his class to learn something new.
2. Nico thinks he needs much more time than other children in his class to learn something new.

What about you? Do you think you need much more time than other children in your class to learn something new?

The children have to solve math problems which the teacher is explaining on the blackboard.

1. Manuel thinks that he understands everything as quickly as other children in his class.
2. Tobias thinks that other children in his class understand everything more quickly than he does.

What about you? Do you think that you understand everything as quickly as other children in your class do?

Distractibility

Simon and Benjamin do their homework. There are children playing outside.

1. Simon has difficulty to get his homework done. He keeps being distracted by the children playing outside.
2. Benjamin is not disturbed by the children playing outside.

What about you? Do you easily get distracted by noises or voices while doing your homework?

The children handicraft their carnival mask.

1. Leon cuts his finger during handcrafting.
2. Joel has finished his carnival mask without hurting himself.

What about you? Do you ever hurt yourself when you are making things in art and craft?

The children are reading a book.

1. Daniel reads one sentence after another. He always remembers what he just read.
2. Benjamin reads some sentences. Suddenly he notices that he forgot what he just read.

What about you? Do you read one sentence after another and always remember what you just read?

The children are at Marco's birthday party. Marco tells Nick and Yves what he got as a present. Other children next to them are speaking and laughing.

1. Patrick listens carefully to Marco. He does not pay attention to the children next to them.
2. Yves has difficulty to listen carefully to Marco. He notes that he is listening to the other children instead of listening to Marco.

What about you? Are you able to listen for a long time without being distracted?

Sustained Attention

The children are in class.

1. Alessandro frequently chats with his neighbour instead of paying attention.
2. Andreas is able to pay attention for a long time. He rarely chats with his neighbour.

What about you? Are you able to pay attention for a long time without chatting with the person sitting next to you?

The teacher writes some math problems on the blackboard.

1. Allan pays attention and tries to solve the problems on the blackboard.
2. Simon is daydreaming. He can't say what he had just been thinking.

What about you? Do you ever daydream but can't say what you had just been thinking?

The children have to write an essay for school.

1. Manuel writes two sentences. He then has difficulties to keep going.
2. Fabian writes until the end of the lesson.

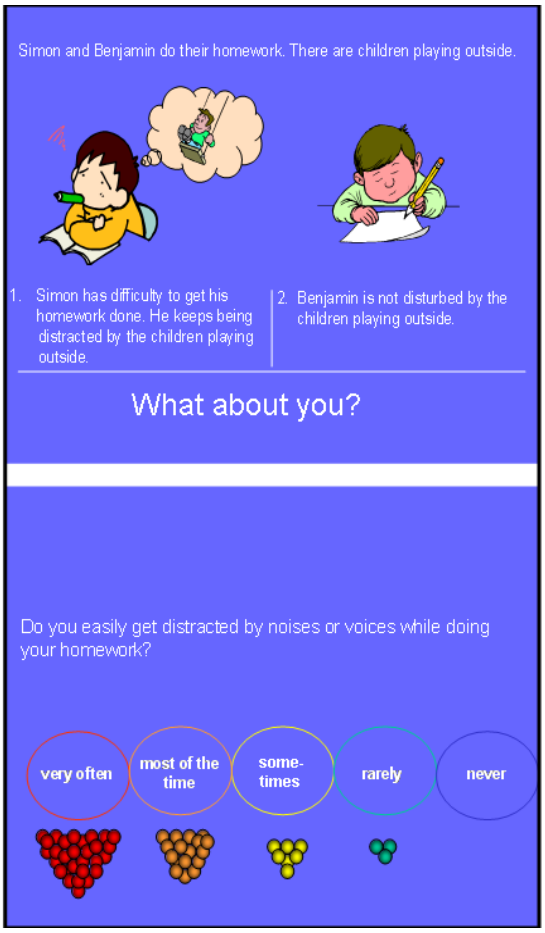
What about you? Are you able to stick to something for a long time?

The teacher says to Michael: “Don’t look out the window all the time. You have to pay attention."

1. The teacher rarely tells Andrin to pay attention.
2. The teacher often tells Ramon to pay attention.

What about you? Does your teacher tell you to pay attention?

Appendix II. *SelfReg item example*



Curriculum Vitae

Educational Background:

1983-1988	High School graduation (Matura Type D) in Switzerland, Switzerland
1996-2002	Psychology studies, University of Zurich, major in Developmental Psychology 1st minor: Psychopathology of Children and Adolescents 2nd minor: Criminology Thesis entitled "Persistent Infant Crying & ADHD"
1996-2002	Student Research Assistant, Developmental Psychology Department, University of Zurich, Switzerland
1999	Practical Education, Zentrum Rötel, Zurich, Switzerland
1999-2000	Academic Stay and Work as a Research Assistant, Psychology Department, University of Herdfordshire, UK
2002	Practical Education, Neuropsychological Department, EPI Swiss Epilepsy Centre, Zurich, Switzerland
2003	1 year of Postgraduate Education in Behavioural Therapy for Children and Adolescents, Academy of Behaviour Therapy in Children and Adolescents, Universities of Zurich, Basel and Fribourg
2002-2006	Research Assistant and Assistant Lecturer, Division of Child and Adolescent Psychopathology, Department of Child and Adolescent Psychiatry, University of Zurich
2006-present	Regular Supervision
2006-present	Further General and on the Job Education (e.g. Burnout, Stress Management, Resilience, Mobbing, Addiction)

Professional Experience:

1989-1996	Different Employments and Leadership Experience in Private Industry (e.g. Banks, Insurances, Chamber of Commerce)
2006-present	Counsellor, Case Manager, Coach and Trainer, Assessment and Development of Individuals, Teams and Organizations of (Multinational) Companies located in Switzerland, Luxembourg, Germany, Austria and Italy, ICAS Switzerland AG, Wallisellen, Switzerland

Published Papers:

Rizzo, P., Steinhausen, H.-C., Drechsler, R. (accepted). Selbst- und Fremdwahrnehmung von Beeinträchtigungen exekutiver Funktionen bei Erwachsenen mit ADHS . *Zeitschrift für Psychiatrie, Psychologie und Psychotherapie.*

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